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ORIGINAL LECTURES.

CONSIDERATIONS CONCERNING SOME EXTERNAL SOURCES OF INFECTION IN THEIR BEARING ON PREVENTIVE MEDICINE.

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No department of medicine has been cultivated in recent years with such zeal and with such fruitful results as that relating to the causes of infectious diseases. The most important of these results for preventive medicine and for the welfare of mankind is the knowledge that a large proportion of the causes of sickness and death are removable.

It is evident that efforts to preserve health will be most intelligently and effectually applied when they are based upon an accurate and full knowledge of the agencies which cause disease. Public and private hygiene, however, can not and, fortunately, has not waited for the full light of that day, whose dawn has only begun to appear, when we shall have a clear insight into the causation of preventable diseases. Cleanliness and comfort demand that means shall be taken to render pure the ground on which we live, the air which we breathe, and the water and food with which we are supplied, and we must meet these needs without waiting to learn just what relation infectious agents bear to the earth, air, water, and food.

It is a fortunate circumstance that modern sanitation has been controlled so largely by the belief in the dependence of endemic and epidemic diseases upon organic impurities in the soil and in the water. Incomplete and even erroneous in many respects as are the views which have prevailed concerning the origin and spread of epidemic diseases by the decomposition of organic substances, the sanitary measures which have been directed toward the removal of filth have achieved great conquests in limiting the development and extension of many infectious diseases. The benefits which one Commonwealth of this country has derived from the intelligent employment of public sanitary measures were clearly and forcibly presented before this Association last year by Dr. Walcott, in his admirable address in State Medicine.

While nothing should be said or need be said to lessen the importance of cleanliness for public health, it is important to bear in mind that hygienic cleanliness and æsthetic cleanliness are not identical. In water which meets the most severe chemical tests of purity, typhoid bacilli have been found. On the other hand, the air in the Berlin sewers, which certainly does not meet the most modest demands of æsthetic cleanliness, has been found to be nearly or quite free from bacteria.

It needs only to be stated to be generally admitted that the scientific basis of preventive medicine must be the accurate knowledge of the causative agents of preventable diseases, a knowledge which can be derived only from a careful study of all the properties of these agents, the modes of their reception and of their elimination by the body, the circumstances which favor and those which retard or prevent their development and spread, their behavior in the various substances which surround us or which we take into our bodies, and the sources of infection, not only those which laboratory experiments show to be possible, but those which are actually operative.

So long as we were unacquainted with the living organisms causing infection, the means at our disposal for studying the etiology of infectious diseases were limited to the observation of all the circumstances which we could determine regarding the origin and spread of these diseases. We could only infer what might be the properties of the infectious agents from the study of phenomena often obscure and difficult of interpretation. Chiefly by this method of investigation the science of epidemiology has been built up. It has established facts and laws no less of practical than of scientific importance. But it has left unsolved many problems and has filled gaps with speculations. Admitted epidemiological facts are often open to various interpretations.

We are evidently at a great advantage when we can study the epidemiological facts with a knowledge of the substances which actually cause infection, and this we are now enabled to do for a limited number of the infectious diseases. This new method of research, which thus far has been mainly bacteriological, has aided us not so much by simplifying the problems of etiology, which still remain complicated enough, as by affording greater accuracy to the results.

It is my aim in this address to consider some results of the modern studies of pathogenic microörganisms in their bearing upon preventive medicine, more particularly upon the sources of infection. It is, of course, impossible within the limits of the address to attempt a complete survey of this important field. Time will permit the presentation of only some of the salient points.

Infectious diseases are those which are caused by the multiplication within the body of pathogenic microorganisms.

It has always been recognized that some infectious diseases, such as the exanthematous fevers, are conveyed directly from the sick to the healthy. It is not disputed that in these evidently contagious diseases the infectious germ is discharged from the body in a state capable at once of giving rise to infection.

In a second group of infectious diseases, of which malaria is the type, the infected individual neither trans-

mits the disease to another person, nor, so far as we know, is capable of infecting a locality. Here there is reason to believe that the infectious germ is not thrown off in a living state from the body, but is destroyed within the body. In this group the origin of infection under natural conditions is always outside of the body.

In a third group there is still dispute whether the disease can be transmitted directly from person to person, but all are agreed that the infected individual can infect a locality. It is especially fortunate that the bacteria which cause cholera and typhoid fever, the two most important representatives of this group of so-called miasmatic-contagious diseases, have been discovered and isolated in pure culture. These are the diseases about whose origin and epidemic extension there has been the greatest controversy. They, above all other diseases, have given the impulse to public sanitation during the last half century. The degree of success with which their extension in a community is prevented is an important gauge of the excellence of the local sanitary arrangements. A clear comprehension of the origin and spread of these diseases signifies the solution of many of the most vexed and important problems of epidemiology and of State hygiene.

It is difficult to understand how those who accept the discovery that the bacteria causing typhoid fever and cholera have been found and cultivated from the stools of patients affected with these diseases can doubt that these patients are possible sources of contagion, or can entertain the view once so widely prevalent, that the infectious germs of these diseases are discharged from the body in a condition incapable of producing immediate infection. In an address delivered on another occasion, I have endeavored to present the considerations which reconcile the comparative infrequency of direct contagion for these diseases with the belief in the elimination of the causative germs in an active state from the body, and have there pointed out several well-known factors which determine the frequency of conveyance of an infectious disease by contagion. There are reasons, some of them very obvious, why diseases in which the infectious substances are operative only when received into the digestive tract, and are discharged usually only with the feces, are less likely to be transmitted by immediate contagion than those diseases in which the virus is thrown off from the skin on epidermal scales.

But the field of operation of direct contagion for these so-called miasmatic-contagious diseases is at most a restricted one, and the chief sources of infection are outside of the body from which primarily the infectious germs may have been derived. It is to these external sources of infection, which are of such importance in public hygiene, that I wish especially to direct attention.

A full comprehension of the sources of infection is, of course, to be obtained only by a detailed study of the etiology of the individual infectious diseases, but this is impossible within the limits of an address. It may, however, be useful to present some of the facts which have a general bearing upon the subject. Let us consider, then, from the point of view of modern bacteriological studies, what *rôle*, in harboring or in transporting infectious agents, may be played by those substances or media with which we necessarily come into intimate contact, such as the air, the ground, the water, and our food.

It is universally admitted that many infectious agents may be transported by the air, but the extent of danger from this source has often been exaggerated. It is a popular error to suppose that most of the minute particles of dust in the air either are or contain living organisms. The methods for determining the number and kind of bacteria and fungi in the air are now fairly satisfactory, although by no means perfect. These have shown that while the number of living bacteria and fungi in the atmosphere in and around human habitations cannot be considered small, still it is greatly inferior to that in the ground or in most waters. Unlike fungus spores, bacteria do not seem to occur to any extent in the air as single detached particles, which would then necessarily be extremely minute, but rather in clumps or attached to particles of dust of relatively large size. As a result in a perfectly quiet atmosphere these comparatively heavy particles which contain bacteria rapidly settle to the ground or upon underlying objects, and are easily filtered out by passing the air through porous substances, such as cotton-wool, or sand. Rain washes down a large number of bacteria from the air.

That the air bacteria are derived from the ground, or objects upon it, is shown by their total absence, as a rule, from sea air at a distance from land, this distance naturally varying with the direction and strength of the wind.

A fact of capital importance in understanding the relations of bacteria to the air, and one of great significance for preventive medicine, is the impossibility of currents of air detaching bacteria from moist surfaces. Substances containing pathogenic bacteria, as, for instance, sputum containing tubercle bacilli or excreta holding typhoid bacilli, cannot, therefore, infect the air unless these substances first become dry and converted into a fine powder. We are able to understand why the expired breath is free from bacteria and cannot convey infection, except as little particles may be mechanically detached by acts of coughing, sneezing, or hawking. Those bacteria, the vitality of which is rapidly destroyed by complete desiccation, such as those of Asiatic cholera, evidently are not likely to be transported as infectious agents by the air, if we except such occasional occurrences as their conveyance for a short distance in spray.

The only pathogenic bacteria which hitherto have been found in the air are the pus organisms, including the streptococcus found by Prudden in a series of cases of diphtheria, and tubercle bacilli; but no far-reaching conclusions can be drawn from the failure to find other infectious organisms when we consider the imperfection of our methods and the small number of observations directed to this point. The evidence in other ways is conclusive that many infectious agents—and here the malarial germ should be prominently mentioned—can be and often are conveyed by the air. While we are inclined to restrict within narrower limits than has been customary the danger of infection through the air, we must recognize that this still remains an important source of infection for many diseases. All those, however, who have worked practically with the cultivation of microorganisms have come to regard contact with infected substances as more dangerous than exposure to the air, and the same lesson may be learned from the methods which modern surgeons have found best adapted to prevent the infection of wounds with the cosmopolitan bacteria which cause suppuration.

We are not, of course, to suppose that infectious germs

floating in the form of dust in the atmosphere are dangerous, only from the possibility of our drawing them in with the breath. Such germs may be deposited on substances with which we readily come into contact, or they may fall on articles of food where they may find conditions suitable for their reproduction, which cannot occur when they are suspended in the air in consequence of the lack of moisture.

From the facts which have been mentioned concerning the relations of bacteria to the air, what points of view present themselves to guide us in preventing infection through this channel? Surely something more than that this purpose is accomplished simply by abolishing foul odors.

Certain indications are so plain as to need only to be mentioned in this connection, such as the disinfection and removal, as far as possible, of all infected substances, an indication which applies equally to all channels of infection, and which it is much easier to mention than it is to describe how it shall be realized. But there are two indications which apply especially to the prevention of the transportation of disease germs by the air. One is the necessity of guarding, as far as practicable, against the desiccation, when exposed to the air, of substances which contain infectious germs not destroyed by drying, and another is free ventilation.

For no disease is the importance of the first of these indications so evident and so well established as for tuberculosis, the most devastating of all infectious diseases. Against this disease, formidable as it may seem to cope with it, the courageous crusade of preventive medicine has begun, and is destined to continue.

It is now generally recognized that the principal, although not the sole, sources of tuberculous infection are the sputum of individuals affected with pulmonary tuberculosis and the milk of tuberculous cows. Cornet, who has made a laborious and most instructive experimental study of the modes and dangers of infection from tuberculous sputum, has also elaborated the practical measures which should be adopted to diminish or annihilate these dangers. These measures have been so recently and so widely published in medical journals, and so clearly presented before a section of this Association, that I mention them only to call the attention of practitioners of medicine to their importance, and to emphasize the fact that infectious substances of such nature as tuberculous sputum should not be allowed to become dry and converted into dust when exposed to the air.

By means of free ventilation, disease-producing microorganisms which may be present in the air of rooms are carried away and distributed so far apart that the chance of infection from this source is removed or reduced to a minimum. It is a well-established clinical observation that the distance through which the specific microbes of such diseases as smallpox or scarlatina are likely to be carried from the patient by the air, in such concentration as to cause infection, is small, usually not more than a few feet, but increases by crowding of patients and absence of free ventilation. The well-known experiences in the prophylaxis and treatment of typhus fever are a forcible illustration of the value of free ventilation.

It is, of course, not to be understood that by ventilation we accomplish the disinfection of a house or apartment. Ventilation is only an adjunct of such disinfection which, as already mentioned, is of first importance. Time will not permit, nor is it in the plan of this address, to discuss the details of such questions as house disinfection, but I may be permitted to say that the methods for disinfecting apartments have been worked out on a satisfactory experimental basis and should be known at least by all public health officers. Whether it be pertinent to this occasion or not, I cannot forbear to add my protest to that of others against placing reliance upon any method hitherto employed of disinfecting houses or apartments by fumigation. And I would, furthermore, call attention to the lack in most cities of this country of public disinfecting establishments such as are in use with excellent results in many cities of Europe, and which are indispensable for the thorough and convenient disinfection of clothing, bedding, carpets, curtains, etc.

After this short digression let us pass from the consideration of the air as a carrier of infection to another important external source of infection, namely, the ground. That the prevalence of many infectious diseases depends upon conditions pertaining to the soil cannot be questioned, but the nature and extent of this influence have been and are the subjects of lively discussion. The epidemiological school led by Pettenkofer assigns, as is well known, to the ground the chief and even a specific and indispensable influence in the spread of many epidemic diseases, particularly cholera and typhoid fever. The statistics, studies, and speculations of epidemiologists which have related to this subject probably surpass in number and extent those concerning any other epidemiological factor. The exclusive ground hypothesis has become an ingenious and carefully elaborated doctrine with those who believe that such diseases as cholera and typhoid fever can never be transmitted by contagion. These authorities cling to this doctrine with a tenacity which indicates that on it depends the survival of the exclusively localistic dogma for these diseases.

To all who have not held aloof from modern bacteriological investigations it must be clear that views which have widely prevailed concerning the relations of many infectious germs to the soil require revision. The question is still a difficult and perplexing one, but on some hitherto obscure or misunderstood points these investigations have shed light, and from the same source we may expect further important contributions to a comprehension of the relations of the ground to the development of infectious diseases.

The ground, unlike the air, is the resting or the breeding place of a vast number of species of microörganisms, including some which are pathogenic. Instead of a few bacteria or fungi in a litre as with the air, we find in most specimens of earth thousands, and often hundreds of thousands, of microörganisms in a cubic centimetre. Fränkel found the virgin soil almost as rich in bacteria and fungi as that around human habitations.

This vast richness in microörganisms belongs, however, only to the superficial layers of the earth. Where the ground has not been greatly disturbed by human hands there is, as a rule, about three to five feet below the surface an abrupt diminution in the number of living organisms, and at the depth where the sub-soil water usually lies, bacteria and fungi have nearly or entirely disappeared. Fränkel, who first observed this sudden diminution in the number of microörganisms at a certain level beneath the surface, explains this singular fact by

the formation at this level of that sticky accumulation of fine particles consisting largely of bacteria which forms the efficient layer in large sand filters for water. Of course, the number of bacteria and the depth to which they penetrate will vary somewhat with the character, especially the porosity, of the soil and its treatment, but the important fact that all, or nearly all, of the bacteria and fungi are retained in the ground above the level of the sub-soil water will doubtless hold true for most situations.

The conditions are not favorable for the multiplication of bacteria in the depth of the ground, as is shown by the fact that in specimens of earth brought to the surface from a depth of a few feet, the bacteria which are at first present, rapidly multiply. What all of the conditions are which prevent the reproduction of bacteria in the deep soil has not been ascertained, but the fact necessitates similar precautions in the bacteriological examination of the soil as in that of water.

We have but meagre information as to the kinds of bacteria present in the ground in comparison with their vast number. Many of those which have been isolated and studied in pure culture possess but little interest for us so far as we know. To some of the microörganisms in the soil appears to be assigned the *rôle* of reducing or of oxidizing highly organized substances to the simple forms required for the nutrition of plants. We are in the habit of considering so much the injurious bacteria that it is pleasant to contemplate this beneficent function so essential to the preservation of life on this globe.

Among the pathogenic bacteria which have their natural home in the soil, the most widely distributed are the bacilli of malignant œdema and those of tetanus. I have found some garden earth in Baltimore extremely rich in tetanus bacilli, so that the inoculation of animals in the laboratory with small bits of this earth rarely fails to produce tetanus. In infected localities the anthrax bacillus and in two instances the typhoid bacillus, so far as it was possible to identify it, have been discovered in the earth. There is reason to believe that other germs infectious to human beings may have their abiding place in the ground; certainly no one doubts that the malarial germ lives there. As the malarial germ has been shown to be an organism entirely different from the bacteria and the fungi, we cannot apply directly to its behavior in the soil and its transportation by the air, facts which have been ascertained only for the latter species of microörganisms, and the same precautions must be observed for other diseases with whose agents of infection we are not acquainted, as, for instance, yellow fever.

In view of the facility with which infectious germs derived from human beings or animals may gain access to the soil, it becomes a matter of great importance to determine how far such germs find in the soil conditions favorable for their preservation or their growth. We have, as is well known, a number of epidemiological observations bearing upon this subject, but with few exceptions these can be variously interpreted, and it is not my purpose to discuss them. The more exact bacteriological methods can, of course, be applied only to the comparatively small number of infectious diseases, the causative germs of which have been isolated and cultivated, and these methods hitherto have been applied to this question only imperfectly. We cannot regard the soil as a definite and unvarying substance in its chemical, physical, and biological properties. What has been found true of one kind of soil may not be so of another.

Moreover, we cannot in our experiments bring together all of the conditions in nature which may have a bearing on the behavior of specific microörganisms in the soil. We must, therefore, be cautious in coming to positive conclusions on this point on the basis of experiments, especially those with negative results. With these cautions kept constantly in mind the question, however, is one eminently open to experimental study.

The experiments which have thus far been made to determine the behavior of infectious microörganisms in the ground have related especially to the bacilli of anthrax, of typhoid fever, and of cholera, and, fortunately, these are the diseases about whose relations to the ground there has been the most discussion and concerning which we are most eager to acquire definite information.

As regards anthrax bacilli, it has been determined that in ordinary garden or field earth they do not multiply, but in earth contaminated by blood, urine, or feces their reproduction can occur. They can grow on various vegetable substrata. There is no reason to doubt, therefore, that the anthrax bacilli can find in or on the ground suitable conditions for their multiplication, although such conditions are not everywhere present. For durable infection of the soil with anthrax bacilli it is, however, more important that these bacilli should find there suitable conditions for the formation of spores, than that they should be able simply to multiply. The vegetative forms of anthrax bacilli would not, as a rule, be able to survive for a great length of time the hostile influences which they are likely to encounter in the ground, such as insufficient or exhausted nutriment, absence of sufficient moisture, and the attacks of saprophytic organisms. On the other hand, against these injurious influences the anthrax spores have great resistance. In the superficial layers of the ground the anthrax bacilli may often find those conditions of moisture, of temperature, of oxygen supply, and of insufficient food which we know are most favorable for the development of their spores; indeed, Soyka has shown that the ground presents often these conditions better than our culture media. A circumstance discovered by Feltz, which, however, needs confirmation, is, if true, of not little significance. He finds that anthrax bacilli may undergo a progressive diminution in virulence in the soil. If this should be true likewise of other infectious microörganisms, we should be able to account, in some instances, for the variable degree of virulence which clinical observation indicates that certain agents of infection acquire. So far as anthrax bacilli are concerned we may conclude, therefore, that the ground occasionally offers suitable conditions for their reproduction, but what is of greater importance, it offers especially favorable conditions for their long-continued preservation in the form of spores. I must forego here the further consideration of the special circumstances inherent in the soil which control the origin and spread of epidemics of anthrax in cattle, although many interesting investigations have been directed to this subject.

Of greater interest to physicians is the behavior of typhoid and of cholera bacteria in the ground. As has already been intimated the ground is regarded by Pettenkofer and his school as the principal breeding-place

of these microörganisms outside of the body. This view, however, is not supported by bacteriological investigations. Inasmuch as the cholera and the typhoid bacilli may multiply on various vegetable substrata and substances derived from animals, at temperatures often present in the ground, it is evident that here and there conditions may be present for their growth in the ground, but this growth is likely to be soon interrupted by the invasion of ordinary saprophytic organisms and other harmful influences. The typhoid bacilli are more hardy in resisting these invaders than are the cholera bacteria, which easily succumb, but even for the former, so far as our present knowledge extends, the ground can rarely serve as a favorable breeding-place.

It is not, however, necessary that these organisms should multiply in order to infect for a considerable time the ground; it is sufficient if their vitality is preserved. As to this latter point, the reports of different investigators are not altogether concordant. Such excellent observers as Koch, Kitasato, and Uffelmann found that the cholera bacteria, when added to feces or a mixture of feces and urine, rapidly diminished in number, and at the end of three, or four days at the most, had wholly disappeared. In a mixture of the intestinal contents from a cholera corpse with earth and water Koch found numerous cholera bacteria at the end of three days, but none at the end of five days. On the other hand, Gruber reports the detection of cholera bacteria in cholera dejecta fifteen days old. The weight of bacteriological evidence, therefore, is opposed to the supposition that the bacteria of Asiatic cholera preserve their vitality for any considerable time in the ground or in the excreta.

With respect to the bacilli which cause typhoid fever, it has been shown by Uffelmann that these may live in feces, mixture of feces and urine, and mixture of garden earth, feces, and urine for at least four and five months, and doubtless longer, although they may die at the end of a shorter period. He also finds that under these apparently unfavorable conditions some multiplication of the bacilli may occur, although not to any considerable extent. Grancher and Deschamps found that typhoid bacilli may live in the soil for at least five months and a half. Unlike the cholera bacteria, therefore, the typhoid bacilli may exist for months at least in the ground and in the fecal matter, holding their own against the growth of multitudes of saprophytes. This difference in the behavior of cholera and of typhoid germs is in harmony with clinical experience.

As regards other infectious bacteria than those which have been considered, I shall only mention that tubercle bacilli, although incapable of multiplication under the ordinary conditions of nature outside of the body, may preserve their vitality for a long period in the ground, on account of their resistant character, and, furthermore, that the pyogenic cocci, on account of their considerably resistant nature and their modest demands in the way of nutriment, can be preserved and sometimes probably grow in the ground. Indeed, the staphylococcus pyogenes aureus has been found in the earth by Lübbert.

The conclusion which we may draw from the observations mentioned is that, in general, the soil is not a good breeding-place for most of the infectious bacteria with which we are acquainted, but that it can retain for a long time with unimpaired vitality those which produce spores or which offer considerable resistance to injurious agencies, such as anthrax bacilli, tubercle bacilli, and the pyogenic cocci.

In order to become infected with bacteria in or on the ground, these bacteria must in some way be introduced into the body and we must, therefore, now attempt to determine how bacteria may be transported to us from the ground. So various and intricate are the possibilities for this transportation that it is hopeless to attempt to specify them all.

There occurs to us first the possibility of the conveyance of infectious microörganisms from the soil by means of currents of air, a mode of carrying infection which has already been considered. Here I shall only repeat that the wind can remove bacteria from the ground only when the surface is dry and presents particles of dust, and that the sole, and perhaps the chief, danger is not that we may inhale the infected dust.

Manifold are the ways in which we may be brought into contact with infectious bacteria in the ground, either directly, or indirectly by means of vegetables to which particles of earth are attached, by the intervention of domestic animals, by the medium of flies or other insects, and in a variety of other ways, more or less apparent.

An important, doubtless for some diseases the most important, medium of transportation of bacteria from an infected soil is the water which we drink or use for domestic purposes. From what has been said, it is evidently not the sub-soil water which is dangerous, for infectious like other bacteria cannot generally reach this in a living state, but the danger is from the surface water and from that which trickles through the upper layers of the ground, as well as from that which escapes from defective drains, gutters, cesspools, privy vaults, and wrongly constructed sewers, or improper disposal of sewage. I shall have something to say presently of water as a source of infection and shall not further elaborate here the dangers of infection of drinking water through contaminated soil, dangers which, especially as regards typhoid fever, are widely appreciated in this country, even if often imperfectly counteracted.

A point which has been much discussed and one of interest, is whether bacteria which are in the depth of the ground can come to the surface. Two agencies especially have been considered by some as capable of transporting bacteria from the depth to the surface. One is ascending currents of air in the ground and the other is the capillarity of fluids in the minute pores of the ground. The first of these suspected agencies must be unquestionably rejected in view of the fact that even a few inches of sand is sufficient to filter all of the bacteria out of the air, even when it is in much more rapid motion than can occur within the ground. Moreover, that degree of dryness which is essential for the detachment of bacteria by air-currents is not likely to be present much below the surface of the ground. The experiments which have been made to determine to what extent bacteria may be carried upward by the capillarity of fluids in the ground have not yielded harmonious results, but the weight of evidence is opposed to the belief that this is a factor of any considerable importance for this purpose.

From what has been said concerning the growth of pathogenic bacteria in the soil we shall not be inclined to attribute to the multiplication and the motility of these organisms much influence in changing their place in the ground.

The somewhat sensational role assigned by Pasteur to earthworms of bringing bacteria to the surface cannot be wholly ignored and has received support from observations of Bollinger regarding anthrax, but it is questionable whether much importance is to be attached to this agency.

Regarding the depth to which typhoid bacilli may penetrate the soil, the experiments of Grancher and Deschamps show that at the end of five weeks they may reach a depth of sixteen to twenty inches below the surface. As Hoffmann has demonstrated the extraordinary slowness with which fluids and fine particles penetrate the soil, it is probable that in the course of time a greater depth than this may be reached. Indeed, Macé claims to have found in soil in the neighborhood of a well, suspected of infection, typhoid bacilli, together with ordinary intestinal bacteria, at a depth of at least six and one-half feet below the surface. There are a number of instances recorded in which there is reason to believe that turning up the soil and cleaning out privies or dung-heaps in which typhoid stools have been thrown, have given rise to typhoid fever, even after the infectious excreta have remained there a year and more.

It can not be said that bacteriological investigations have as yet shed much light upon a factor which plays a great *rôle* in epidemiology, namely, predisposition to infection from the ground according to locality and time, and this deficiency receives constant and vehement emphasis from the localistic school of epidemiologists. We can, however, readily understand that varying conditions, such as temperature, moisture, porosity, quality of soil, may exert a controlling influence in determining the behavior of infectious germs in the soil and the facility of their transportation to human beings or animals. As regards that much-discussed question, the significance of variations in the height of the sub-soil water in relation to the prevalence of certain epidemic diseases, particularly cholera and typhoid fever, we now know that this can not depend upon the presence of bacteria in the sub-soil water itself or in the capillary layers immediately above it. It has been plausibly suggested that with the sinking of the sub-soil water fluids from infected cesspools, privy vaults, and other localities may more readily be drawn into wells or other sources of water supply, and that by the same cause the surface of the ground becomes dry so that dust particles may be lifted by the wind. Other more or less plausible explanations have also been offered, but it must be confessed that our positive information on this point is meagre. There can, however, be little doubt that this significance of the variations in sub-soil water is apparent only for certain localities and has been considerably exaggerated and often misunderstood. It is not, however, pertinent to my theme to discuss this or other purely epidemiological observations concerning the relations of the ground to the spread of epidemic diseases, interesting and important as are many of these observations.

Before leaving the subject of the ground as a source of infection, permit me to indicate briefly some conclusions which may be drawn from what has been said as to the principles which should guide us in preventing infection directly or indirectly from the ground.

First in importance is to keep infectious substances as far as possible from the ground. This implies the early disinfection or destruction of such substances as typhoid and cholera excreta and tuberculous sputum.

Second. The ground should be rendered as far as practicable unsuitable for the continued existence of infectious germs. This, at least for some diseases, is accomplished by a proper system of drainage, which, moreover, for other reasons possesses hygienic importance.

Third. Means should be provided to prevent waste products from getting into the ground around human habitations or from gaining access to water used for drinking or domestic purposes. In cities this can be accomplished only by a properly constructed system of sewers. The system of storing waste products in cesspools whence they are to be occasionally removed can not be approved on hygienic grounds. There are conditions in which the disposal of waste products in deep wells only used for this purpose and whence these products can filter into the deep layers of the ground may be permissible, but this can never be considered an ideal method of getting rid of excrementitious substances and is wholly wrong in regions where wells are used for drinking water. But I am trespassing with these remarks upon a province which does not belong to me but rather to practical sanitarians and engineers. I shall only add that the advantage gained by preventing organic waste from soaking into the ground is not so much that the ground is thereby rendered better adapted to the existence of infectious microörganisms, but is due rather to the fact that this waste is likely to contain infectious germs.

Finally, in cities, good pavements, absence of unnecessary disturbance of the soil, cleanliness of the streets, and laying of dust by sprinkling, are not only conducive to comfort but are sometimes hygienically important in preventing infection from the ground and dust.

In passing from the consideration of the ground to that of water, one feels that he now has to do with a possible source of infection against which in this country and in England he is at liberty to make any accusation he chooses without fear of contradiction. There is reason to believe that such accusation has been repeatedly made without any proof of misdemeanor on the part of the water. It is not, therefore, with any desire to awaken further the medical or the public conscience that I wish to say a few words concerning the behavior of bacteria in water and the dangers of infection from this source. That such dangers are very real, must be apparent when we consider the universal employment of water and its exposure to contamination from all kinds of sources.

Ordinary water, as is well known, contains bacteria in large number. Not a few species of bacteria can multiply rapidly and to a large amount even in distilled water. These are the so-called water-bacteria, and, like most of the microörganisms found in ordinary drinking water, are perfectly harmless saprophytes. What we wish to know is, how pathogenic microörganisms conduct themselves in water. Can they grow or be preserved for any length of time in a living condition in water? As regards the multiplication of pathogenic bacteria in water, the results of different experimenters do not altogether agree. Whereas, Bolton failed to find any growth, but rather a progressive diminution in number of pathogenic bacteria planted in sterilized water, Wolff-

hügel and Riedel observed a limited reproduction of such bacteria, including those of typhoid fever and of cholera. This difference is due probably to the methods of experimentation employed. According to Kraus, these latter bacteria diminish rapidly in number in unsterilized spring or well water kept at a low temperature. These experiments indicate that water, even when contaminated with more organic impurities than are likely ever to be present in drinking water, is not a favorable breed ng-place for pathogenic bacteria. Still, it is to be remembered that these laboratory experiments do not reproduce exactly all of the conditions in nature, and it may happen that in some nook, or cranny, or vegetable deposit at the side of a well or stream some pathogenic bacteria may find suitable conditions for their multiplication.

But, as has been repeatedly emphasized in this address, it is not necessary that pathogenic bacteria should actually multiply in a medium in order to render it infectious. It is sufficient, if their life and virulence are not destroyed in a very short time. As to this important point, Bolton found that in sterilized water typhoid bacilli may preserve their vitality for over three months, and cholera bacteria for eight to fourteen days, while Wolffhügel and Riedel preserved the latter in water for about eighty days. Under natural conditions, however, these organisms are exposed to the overgrowth of the water bacteria, so that Kraus found in unsterilized water kept at a temperature of 10.5° C. (50.9° F.), the typhoid bacilli no longer demonstrable after seven days, and the cholera bacteria after two days. The conditions in Kraus's experiments were as unfavorable as possible for the continued existence of these pathogenic bacteria, more unfavorable than those often present at the season of prevalence of cholera and typhoid fever; nevertheless, I do not see that the experimental results justify the conclusions of Kraus as to the slight probability of drinking water ever conveying infection with the germs of typhoid fever and of cholera. To render such a conclusion probable it would be necessary to demonstrate a much shorter preservation than even Kraus himself found. In judging this question it should not be overlooked that infection of drinking water with the typhoid or the cholera germs is not so often the result of throwing typhoid or cholera stools directly into the source of water supply, as it is the consequence of leaky drains, cesspools, privy-vaults, or infected soil, so that there may be continued or repeated accessions of infected material to the water.

In view of the facts presented, there is no sufficient reason, therefore, from a bacteriological point of view, of rejecting the transmissibility of typhoid fever and cholera by the medium of the drinking-water. This conclusion seems irresistible when we call to mind that Koch once found the cholera bacteria in large numbers in the water of a tank in India, and that the typhoid bacilli have been repeatedly found in drinking water of localities where typhoid fever existed. Nor do I see how it is possible to interpret certain epidemiological facts in any other way than by assuming that these diseases can be contracted from infected drinking water, although I know that there are still high authorities who obstinately refuse to accept this interpretation of the facts.

In this connection it may be mentioned that pathogenic bacteria may preserve their vitality longer in ice than in unsterilized drinking water. Thus, Prudden found typhoid bacilli still alive which had been contained in ice for one hundred and three days.

When we come to consider the ways in which water may become infected with pathogenic microörganisms we recognize at once a distinction, in this respect, between surface water and sub-soil water. Whereas the sub-soil water may be regarded under ordinary circumstances and in most places as germ-free, the surface water, such as that in rivers and streams, is exposed to all manner of infection from the ground, the air, and the direct admission of waste substances. Unfortunately, in the ordinary way of obtaining sub-soil water for drinking purposes, by means of dug wells, this distinction is obliterated, for the water which enters these wells free from bacteria is converted into a surface water often exposed, by the situation of the well, to more dangerous contamination than other surface waters used for drinking purposes.

Now let us turn our attention, as we have done with other sources of infection, to a brief outline of certain general principles which may help us in avoiding infection from the water.

We shall, in the first place, avoid as far as possible the use of water suspected of infection, especially with the germs of such diseases as typhoid fever and cholera. When it is necessary to use this suspected water it should be boiled.

As regards the vital question of water supply, it may be stated as a general principle that no hygienic guarantee can be given for the purity of surface water which has not been subjected to a proper system of filtration, or for the purity of spring or well water fed from the sub-soil unless such water is protected from the possibility of infection through the upper layers of the soil or from the air. This is not saying that water which meets certain chemical and biological tests, and which is so situated that the opportunities for its contamination appear to be absent or reduced to a minimum, is not admissible for the supply of drinking water, but the possibility of infection can be removed only by the fulfilment of the conditions just named, and upon these conditions the hygienic purist will always insist.

Unfortunately, we have at present no domestic filters which are satisfactory, and most of those in common use are worse than none, as they soon furnish a filtrate richer in bacteria than the original water. The only effective method of water-filtration for the general supply is by means of large sand filters, such as are in use with excellent results in Berlin and some other cities. These require skilled attention. I cannot on this occasion discuss the construction or working of these filters, but would refer those who are interested to the full and careful investigations of the Berlin filters by Wolffhügel and by Plagge and Proskauer.

What is accomplished by these artificial sand filters is accomplished under natural conditions also by the ground, which furnishes a sub-soil water free from microorganisms, and to obtain pure water we have only to devise means by which this sub-soil water may be secured without the chance of contamination. Just as the water, which has passed through the sand filters, is collected in suitable reservoirs and is distributed in pipes, which do not admit contamination from without, so by means of properly constructed artesian or driven wells we may

secure the naturally filtered sub-soil water with the same freedom from the chances of infection.

It is well to bear in mind that no biological or chemical tests of water can replace those measures which have been mentioned as necessary to secure purity of water supply. These tests are of value only when applied with proper precautions and with due consideration of the special circumstances of each case for which they are employed.

There has been much profitless discussion as to whether greater significance is to be attached to the chemical or to the bacteriological examination of water. Each has its own special field of application, and in this the one cannot replace the other method. The bacteriological examination has for hygienic purposes the advantage that it may enable us to detect the specific agents of infection in the form of microörganisms, as has already been done for cholera bacteria and typhoid bacilli, but this is a comparatively rare result and does not at present afford a wide field of application for this method. The significance of the bacteriological test is to be based more frequently upon the fact that it concerns itself with the same class of microörganisms to which some of the recognized and doubtless many of the undiscovered infectious agents belong, and from the behavior of which in some respects conclusions can be drawn as to the behavior of the pathogenic organisms. Thus the bacteriological test is the only one which enables us to judge correctly of the efficacy of those methods of filtration of surface water and of construction of wells which insure purity of water supply. The points of view from which we can estimate correctly, according to our present knowledge, the relative merits and fields of application of the chemical and of the bacteriological methods of water examination have been clearly indicated by Plagge and Proskauer and by Wolffhügel. The theme is one beyond the limits or the scope of this discourse, and I have referred to it chiefly to emphasize the fact that we cannot rely upon chemical or bacteriological tests of water to the exclusion of those protective measures which have been mentioned, although I do not intend to imply that each of these tests when properly employed does not afford important information and is not of great value in many cases.

I have already taxed so largely your time and patience that I must pass over with brief mention the food as a source of infection. Unlike those external sources of infection, which we have hitherto considered, many articles of food afford an excellent nutritive medium for the growth of a number of species of pathogenic microorganisms, and in many instances this growth may be abundant without appreciable change in the appearance or taste of the food.

When we consider in how large degree the certainty and the severity of infection with many kinds of pathogenic microörganisms depend upon the number of such organisms received into the body, we can appreciate that the danger of infection from food which contains a mass of growing pathogenic bacteria may be much greater than that resulting from the reception of infected water or air, media in which infectious organisms are rarely present in other than a very dilute condition. The entrance into the body of a single infectious bacterium with the inspired air is, at least in the case of many diseases, not likely to cause infection; but let this bacterium fall upon some article of food, as for instance upon milk, where it can multiply in a short time at a favorable temperature many thousand fold, and evidently the chances of infection become vastly increased.

Among the various agencies by which infectious organisms may gain access to the food may be mentioned the deposition of dust conveyed by the air, earth adhering to vegetables, water used in mixing with or in the preparation of food, in cleansing dishes, cloths, etc., and contact in manifold other ways with infected substances.

Fortunately, a very large part of our food is sterilized in the process of cooking shortly before it is partaken, so that the danger of infection from this source is greatly diminished and comes into consideration only for uncooked or partly cooked food and for food which, although it may have been thoroughly sterilized by heat, is allowed to stand considerable time before it is used. Milk, in consequence of its extensive employment in an unsterilized state and of the excellent nutritive conditions which it presents to many pathogenic bacteria, should be emphasized as especially liable to convey certain kinds of infection—a fact supported not less by bacteriological than by clinical observations. Hesse found that also a large number of ordinary articles of food prepared in the kitchen in the usual way for the table and then sterilized afford a good medium for the growth and preservation of typhoid and cholera bacteria, frequently without appreciable change in the appearance of the food.

Upon solid articles of food bacteria may multiply in separate colonies so that it may readily happen that only one or two of those who partake of the food eat the infected part, whereas with infected liquids, such as milk, the infection is more likely to be transmitted to a larger number of those who are exposed.

In another important particular the food differs from the other sources of infection which we have considered. Not only the growth of infectious bacteria, but also that of bacteria incapable of multiplication within the body may give rise in milk and other kinds of food to various ptomaines, products of fermentation, and other injurious substances which when ingested are likely to cause more or less severe intoxication, or to render the alimentary tract more susceptible to the invasion and multiplication of genuinely infectious organisms.

It is plain that the liability to infection from food will vary according to locality and season. In some places and among some races the proportion of uncooked food used is much greater than in other places and among other races. In general, in summer and in autumn the quantity of fruit and food ingested in the raw state is greater than at other seasons, and during the summer and autumn there is also greater danger from the transportation of disease germs from the ground in the form of dust and the amount of liquids imbibed is greater. The elements of predisposition according to place and time upon which epidemiologists are so fond of laying stress are not, therefore, absent from the source of infection now under consideration.

I have thus far spoken only of the secondary infection of food by pathogenic microörganisms, but, as is well known, the substances used for food may be primarily infected.

Chief in importance in this latter category are the vari-

ous entozoa and other parasites which infest animals slaughtered for food. The dangers to mankind resulting from the diseases of animals form a separate theme which would require more time and space than this address affords for their proper consideration. I shall content myself on this occasion with only a brief reference to infection from the milk and flesh of tuberculous cattle.

It has been abundantly demonstrated by numerous experiments that the milk from tuberculous cows is capable, when ingested, of causing tuberculosis. The milk may be infectious not only in cases in which the udder is tuberculous but also when the tuberculous process is localized elsewhere. How serious is the danger may be seen from the statistics of Bollinger, who found with cows affected with extensive tuberculosis the milk infectious in eighty per cent. of the cases, in cows with moderate tuberculosis the milk infectious in sixty-six per cent. of the cases, and in cows with slight tuberculosis the milk infectious in thirty-three per cent. of the cases. Dilution of the infected milk with other milk or with water diminished or in sufficient degree it removed the dangers of infection. There is reason to believe that many of the so-called scrofulous affections in children are due to infection from milk derived from tuberculous cows. Probably for adults the danger of acquiring tuberculosis from the use of infected milk is relatively small. Bollinger estimates that at least five per cent. of the cows are tuberculous. From statistics furnished me by Mr. A. W. Clement, V. S., it appears that the number of tuberculous cows in Baltimore which are slaughtered is not less than three to four per cent. Among some breeds of cows tuberculosis is known to be much more prevalent than this.

There is no evidence that the meat of tuberculous cattle contains tubercle bacilli in sufficient number to convey infection, unless it be very exceptionally. Nevertheless, one will not willingly consume meat from an animal known to be tuberculous. This instinctive repugnance, as well as the possibility of post-mortem infection of the meat in dressing the animal seem good grounds for discarding such meat. The question, however, as to the rejection of meat of tuberculous animals has important economic bearings and has not been satisfactorily settled. As to the propriety of the rejection of the milk from such animals, a matter, however, not easily controlled, there can be no difference of opinion.

The practical measures to adopt in order to avoid infection from the food are for the most part sufficiently obvious. Still it is not to be expected that every possibility of infection from this source will be avoided. The pleasure of living would be destroyed if one had his mind constantly upon escaping possible dangers of infection. It is difficult to discuss the matters considered in this address without seeming to pose as an alarmist. But it is the superficial and half knowledge of these subjects which is most likely to exaggerate the dangers and awaken unreasonable fears. While one will not, under ordinary circumstances, refrain from eating raw fruit or food which is palatable, although it may not have been thoroughly sterilized by heat, or from using the natural water unboiled, in the fear that he may swallow typhoid or cholera bacteria, still in a locality infected with typhoid fever or cholera he will, if wise, not allow himself the same freedom in these respects. Cow's milk, unless its source can be carefully controlled, when used as an habitual article of diet, as with infants, should be boiled or the mixed milk of a number of cows should be selected; but this latter precaution offers less protection than the former.

In most places in this country we are sadly lacking in good sanitary inspection of the food, especially of the animal food, offered for sale. One cannot visit the admirable slaughter-house in Berlin or that in Munich, and doubtless similar ones are to be found elsewhere, and watch the intelligent and skilled inspection of the slaughtered animals without being impressed with our deficiency in this respect. In large cities an essential condition for the efficient sanitary inspection of animal food is that there should be only a few places, and preferably only one place, where animals are permitted to be slaughtered. Well-trained veterinarians should be selected for much of the work of inspection.

It may reasonably be asked that the National Government, which has already spent so much money for the extermination of such diseases as pleuro-pneumonia of cattle and hog cholera, which are not known to endanger the health of mankind, should turn some of its resources and energies also to means for the eradication of tuberculosis from cattle, which is a scourge not only to the economic interests of farmers and dairymen, but also to the health of human beings.

Without any pretension to having done more in this address than to sketch here and there a few principles derived from bacteriological researches concerning only some of the most widely distributed external sources of infection, I trust that enough has been said to show the folly of any exclusive dogma as to modes of infection. The ways of infection, even in one and the same disease, are manifold and various, and can never be resolved into exclusive hypotheses, such as the drinking-water hypothesis, the ground hypothesis, etc.

It follows, therefore, that it is not by sanitary improvements in one direction only that we can control the spread of preventable epidemic diseases. In one situation improvements in the supply of drinking-water check the prevalence of typhoid fever, in another place similar measures show no such influence; or again, in one city the introduction of a good system of sewerage diminishes epidemic diseases, and in another no similar result follows. We should, therefore, aim to secure as far as possible good sanitary arrangements in all directions and in all respects.

It has also been rendered evident in what has been said that infectious agents differ markedly from each other in their behavior, so that while public sanitation aims at those measures which are found to be most widely beneficial, it should not forget that each infectious disease is as much a separate problem in its prophylaxis, as in its symptomatology, etiology, and treatment. It will not aim to combat cholera with the means found best suited to scarlet fever, but it will adapt preventive measures as directly to the specific end in view as possible.

In presenting to you the results of researches, chiefly bacteriological, concerning the scientific basis of preventive medicine, I hope to escape the accusation of one-sidedness and narrowness by the statement that I do not for a moment intend to imply that the bacteriological method is our only source of accurate knowledge on the subjects which have been considered. My aim is accom-

plished if I have succeeded in making clear that this method has established facts which aid in a clearer conception of the causes of some important infectious diseases, in a better understanding of the sources and dangers of infection, and in a more efficient selection and application of sanitary measures.

If this science of only a few years' growth has furnished already acquisitions to knowledge so important, so far-reaching, may we not look forward with assurance to the solution of many dark problems in the domain of infectious diseases, problems the solution of which may yield to preventive medicine a future of usefulness and success which we cannot now foresee.

ORIGINAL ARTICLES.

TETANOID PARAPLEGIA, WITH CASES.

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SINCE attention was first directed in 1873, by Seguin,[1] to a symptom group now known as tetanoid paraplegia (Seguin), spastic spinal paralysis (Erb[2]), and tabes dorsal spasmodique (Charcot[3]), etc., much has been written upon the subject. Some confusion, however, still exists, owing in great measure to the multiplicity of terms by which the affection is known. In fact, many of the statements made in the first paper of Seguin were subsequently modified; out of the five cases reported, three were cases of Pott's disease, one was a case of amyotrophic lateral sclerosis (verified by post-mortem examination), and one a case of specific myelitis.

From these severe cases with marked lesions, to those functional cases dependent on genital or other peripheral irritation (Sayre), the number and variety of cases presenting a tetanoid condition of the muscles is large. These, from a pathological standpoint, are best divided, according to Seguin, into those due to

1. Primary sclerosis of the lateral columns (crossed pyramidal column);
2. Various lesions of the spinal cord, chiefly myelitis;
3. Functional tetanoid paraplegia (Sayre); and
4. Defective cerebral development.

It is, however, more particularly with that group of the affection occurring in children (frequently premature), in which, with or without defective cerebral development, with or without a discoverable lesion, the limbs are contracted, adducted, stiffened, and incoördinate, that the writer is interested, and of which he wishes to record five cases which have come under his notice during the last three years. These cases are such as that referred to by Seguin,[1] of a child, six years of age, attending his clinic, and of the two boys reported by Erb,[2] aged four and a half and three and a half years respectively, the first of premature (seven months) birth, in none of which was there any hereditary predisposition or cause discoverable. Similar cases were also recorded, before the disease was well understood, by such orthopedic writers as Adams,[3] who described them as "deformity with rigid muscles," and also earlier by Little,[4] as "spastic contraction," and it is interesting to observe that both refer to premature birth as a probable cause, the latter[5] citing twelve cases out of twenty-four, eight of whom were in the seventh month, as were also one of Erb's and one of the writer's.

Symptoms.—In children the condition usually appears at birth, or within the first year, although it may occur later. There is no osseous lesion (Pott's) nor pressure symptoms (myelitis), and they present the following symptoms: The lower limbs are drawn by the strongest muscles into a condition of spasmodic rigidity, the thighs flexed upon the pelvis and slightly adducted, the knees flexed and firmly adducted, so that they touch, or even overlap, the feet inverted and strongly extended in a position of extreme equino-varus. The contractions readily yield to firm, continuous manual pressure, but immediately return upon its removal. The child stands with assistance, resting upon the ball of the foot and toes, and walks, if at all, with a rapid, swinging, irregular gait, typical of the disease, and with the knees overlapping at every step. There is usually no anæsthesia, ataxia, atrophy, or any vesical or rectal incontinence, such as is found in the graver forms. There is no loss of equilibrium standing with the eyes closed, and the reflexes are exaggerated.

In the upper extremity the same condition exists, but to a less degree. The arms are approximated to the side, the forearm slightly flexed, and the hands flexed and pronated. The flexors of the trunk are sometimes contracted, and the head may be drawn forward and to one side (wry-neck). Strabismus may occur early, and occasionally persists. The configuration of the head at times resembles that of the idiot, and with the half-silly, vacant stare, and an imperfect speech, presents the appearance of a lack of intelligence which does not always exist.

CASE I. was studied by the writer while under the care of Dr. Roberts at the Philadelphia Hospital, and the report is taken from his Clinical Lectures:[6]

[1] Archives of Scien. and Prev. Medicine, Feb. 1873, New York, p. 100.
[2] Zeitschrift für Psychiatrie, Bd. xxxii., 1875.
[3] Leçons sur les Maladies du Système nerveaux, 1887, t. ii., 15me., Leçon, p. 275.
[1] Archives of Medicine, February, 1879, p. 9.
[2] Memorabilien, 1887, 12 Heft.
[3] Club-foot, etc., Jacksonian prize, 2d ed., 1873, p. 64.
[4] Def. of the Human Frame, London, 1853, p. 106.
[5] Ibid, p. 117.
[6] Clin. Lectures on Orthopedic Surgery, No. 1, 1886, p. 10.

"Barney, æt. six years. No record or information could be obtained regarding previous history. . . . The thighs are adducted and slightly flexed upon the pelvis. The legs are held firmly at a moderate degree of flexion at the knee-joint. The feet are extended and inverted in the position of pronounced equino-varus. All muscular groups of the lower limbs are in a condition of spasmodic rigidity. . . . These contractions may be temporarily overcome by firm and continuous pressure, but immediately reappear upon the removal of the opposing force. Locomotion, with assistance, is accomplished with difficulty by a swinging, discordant gait typical of the disease, the patient walking only upon the ball of the feet and toes, the weight of his body not being sufficient to overcome the contraction and bring the heels to the floor. The other symptoms characteristic of the central lesion—deficient intelligence, strabismus, exaggerated muscular reflexes, and general rigidity and spasm of the muscular system—are all present. Tenotomy of each tendo Achillis was performed, with marked improvement in his condition."

CASE II.—Ella S., female, æt. two years, residing in Philadelphia, came under my care in September, 1886. Father blacksmith by occupation, in good health, but all his family had died of phthisis. Mother in good health, but natural sister has chorea. The child has one brother and three sisters, all in good health, except one sister who has urinary trouble (?).

There was no direct cause for the deformity. It was first noticed that the child could not sit alone nor creep, and later, that it could rise but could not stand nor walk alone. The lower extremities were in a condition of spastic contracture, the feet being in a position of equino-varus.

Under tonics, sedatives, and massage without tenotomy, the condition rapidly improved, and the case was reported by letter after four months cured.

CASE III.—Eddie S., male, æt. five years, born in Pennsylvania, came under the writer's care in the spring of 1887. Father, laborer, was in good health. The mother has some uterine disease (?). No hereditary tendency could be elicited, nor cause assigned for the deformity. It was first noticed that the child walked late (not until two and a half years). The symptoms of contracture gradually advanced, and an examination presented the condition above described. The patient was put under treatment, but disappeared from notice before a cure had been effected.

CASE IV.—Annie D., æt. five years, born in Ireland, of Irish parents. Father, laborer, in good health. Mother in fair health. Has two brothers and one sister, all in good health. There is no hereditary predisposition or cause known.

It was first noticed when the child began to walk, that the left ankle was weak. The patient is a well-nourished brunette child in good general health. The left lower extremity is somewhat wasted, and in the position already described, the foot in a position of equino-varus, its flexion and extension (extreme) limited by spasmodic contraction. The temperature is somewhat lowered. Under appropriate treatment the case improved.

CASE V.—Maggie F., female, æt. four, born in New Jersey, of healthy Irish parents, at the seventh month, the mother having suffered a severe fall. She was hand-fed from birth, and for many months she remained small and delicate. There was no hereditary predisposition to nervous affections, nor any cause known. Her present condition (May, 1889) is that of a small, brunette, poorly developed child, with "silly" expression and hesitating speech. The mental condition, however, appears to be good. There is no vesical or rectal difficulty. The skin and muscles are normal. Both lower extremities, and the right upper extremity, are in a condition of tetanoid paraplegia. The position of the former is characteristic, and the contractions can all be overcome by manual pressure except the left foot, which cannot be brought beyond 90°. With assistance, locomotion is accomplished by short, quick, irregular steps, the knees crossing and the feet extended. She is still under observation and treatment.

Prognosis will depend upon the cause. If this be a central lesion, little can be accomplished without operative interference; but if from peripheral irritation, the removal of this may at least temporarily relieve the symptoms.

Treatment should consist of tonics and sedatives combined with friction and massage. If the contraction appears to be due to an adherent or contracted prepuce, circumcision should be at once performed. This, in a certain number of cases, has no effect whatever, or is only temporarily beneficial, as pointed out by Dr. Eugene Dupuy,[1] referring to the cases reported by Sayre,[2] and the writer has observed the same in a case operated upon by another surgeon.

An attempt should be made to straighten the contracted parts by mechanical stretching, after the well-known method of Dr. Newton M. Schaffer, of New York, failing in which tenotomy should be performed, the parts that will require division being usually the tendo Achillis, adductors of foot, hamstrings, and adductors of thigh. This, as the researches of Rupprecht[3] demonstrate, not only improves the position of the limbs, but also decidedly benefits the mental condition. After tenotomy an ordinary varus walking shoe, combined with a Congdon to fix the knee, should be worn for some time.

A THIRD CASE OF HEREDITARY CHOREA.[4]

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THE earliest mention of the hereditary form of chorea which we find in medical literature is in a communication from Dr. C. O. Waters, of Franklin, N. Y., to Prof. Robley Dunglison, of Philadelphia,

[1] Journ. Nerv. and Ment. Dis., April, 1887, p. 232.
[2] On Reflex, Paralysis, etc., Trans. Amer. Med. Assoc., 1870.
[3] Volkmann's Clinical Lectures.
[4] A paper read before the Cattaraugus County Medical Society, June 5, 1889.

and is dated May 5, 1841. The salient points differentiating it from the ordinary form of the disease were stated by him to be: 1st, its development in adult life; 2d, heredity its only known etiological factor; 3d, its constantly progressive character and death its only termination. This letter was published by Prof. Dunglison in his forthcoming work on the Practice of Medicine, and may be found in the third edition, volume 2, page 216.

In 1872 Dr. George Huntington, of Pomeroy, Ohio, called attention[1] to this disease, and until recently I have considered this the second paper published on the subject. But, from a valuable monograph by Dr. Wharton Sinkler, of Philadelphia, a reprint of which he has kindly sent me, I find that Dr. Irving W. Lyon preceded Huntington with a paper[2] which was published in the *American Medical Times* for December 19, 1863. He speaks in particular of the hereditary nature of the disease, and cites brief histories of three cases in his practice.

I have been familiar with this form of chorea for years, and recollect the fear and timidity which possessed me when in childhood I was obliged to pass one of these patients on my way to and from school. Later, I made this disease the subject of a thesis which I presented for my degree in medicine in February, 1885, and which was published in the *New York Medical Journal* of April 25th. In that brochure I narrated the history of the disease as observed in these patients, and made reference to the observations of Waters and Huntington.

A second case of hereditary chorea occurred in my practice at the Cattaraugus County Insane Asylum in 1886, and a short account of it was given by me in the *Medical Press of Western New York* for December. I now wish to call attention to a third series of cases, two of the patients likewise being under my care at the insane asylum.

Mrs. S., aged thirty-eight, married, mother of one child, which died in infancy. Has suffered from chorea since she was twenty years of age; was admitted to the asylum May 19, 1886, and placed in the ward for imbeciles. She died of chorea January 30, 1888.

The earliest occurrence of this disease which we can find among this patient's ancestors was in the person of her paternal grandmother, Mrs. C. She is said to have died with chorea at an advanced age, having suffered with it for many years.

Mrs. C. had four children, one of whom—Abel C., the father of our patient—was afflicted with it from about the age of forty to the time of his death at seventy years; the other three children escaped, and none of their progeny, so far as is known, have ever developed the disease. Abel C. was an inmate in the poor department of our county asylum for about two and a half years, and died there several years before my service as physician began. No written history of his case was made, but the superintendent and my father, who was the physician in attendance at that time, remember well the patient.

Abel C. had six children, all of whom lived to have families. Two of these, Mrs. S., our patient at the time of her death, and Henry C., who is now under our care, became afflicted with the disease, the other four children escaping it. Of their descendants, however, no reliable information is obtainable.

Henry C., Mrs. S.'s brother and our present patient, is sixty years of age and has had this disease gradually coming on for fourteen years. He is the father of eight children, the eldest about twenty-two years of age. He has two children under fourteen years of age. Two of his children are said to show unmistakable signs of the disease, their ages being eighteen and sixteen years.

Present condition.—Nearly every muscle seems to be involved, the movements being increased if the patient is watched, but ceasing entirely during sleep. Respiration irregular; can walk without assistance but occasionally falls; is able to stand for a short time and walk a few steps with his eyes closed;[1] patellar reflex present; appetite good but not voracious; body well nourished; bowels regular; somewhat wakeful at night; eyes apparently normal; memory poor and mind evidently failing, but without hallucinations.

Elsewhere[2] I have made the statement that the appetite is greatly increased, especially in the advanced stages of the disease, and continues unabated until a short time before death. This I have noticed in two of my patients, and it is said to have been the case with others in the family of my first patients, at least, who died of the disease. Mrs. S. had food in her mouth almost continually, but it would be impossible to estimate how much she swallowed, as a large proportion of it escaped from her mouth during mastication. Henry C.'s appetite is only good for a non-laboring man. Other writers on hereditary chorea make no mention of an excessive appetite attending the disease, but several speak of the "good appetite" which their patients enjoy.

I have also noticed that some patients have certain peculiarities about their movements which others have not. Thus, Mrs. S. was accustomed to stand for many hours, especially when trying to masticate food, with her body thrown forward to the level of her hips and her arms extended backward by the side of her body, the palms being upward. She only assumed the upright position, unless spoken to,

[1] Medical and Surgical Reporter, April 13, 1872.

[2] Chronic Hereditary Chorea. By Irving W. Lyon, M.D.

[1] Other patients, not as far advanced with this disease, whom I have tested for this symptom, so prominent in locomotor ataxia, have been able to stand for any length of time and walk any distance with the eyes closed.

[2] Medical Press of Western New York, December, 1886.

at long intervals and then only for a few seconds. Henry C. frequently extends one arm as if to grasp some object in front of his face. Another patient developed a peculiar gait in walking which I have described in detail in a former paper.

It has been said that this form of chorea appears only in adult life, but to this rule there are exceptions. Hoffmann has reported a case in which choreic movements began at ten years, and Lyon one in which they had existed "from puberty." As mentioned above, two of Henry C.'s children showed choreic symptoms at sixteen and eighteen years of age.

In the earlier stages the sexual function seems to be but little impaired; later, it is notably weakened or entirely lost. Henry C. became the father of two children after he began to show choreic symptoms. Mrs. S. did not menstruate while under our observation. Other writers have made no observations as to the sexual functions, and I am unable to find another instance mentioned in the literature of the disease where a child was born after either parent became choreic. Huber mentions a lady, a sister of his patient, who gave birth to a child in 1877, having been "slower in her work, and indifferent" since 1873. After this she became "unruly and forgetful," and in 1880 showed choreic movements of the elbow.

Concerning the pathology of the disease, I will admit that I know nothing definite. In the case of the father of Huber's patient, who died insane, having had chorea for years, an autopsy revealed the presence of "pachymeningitis and internal meningitis." Dr. William Osler, of Philadelphia, has recently made an autopsy on a patient dying with this disease, but I have not seen a report of it as yet. One fact, however, appears to be demonstrated to the satisfaction of the profession, and that is, the close relation between hereditary chorea and other diseases of the nervous centres, notably epilepsy and insanity. Indeed, insanity appears to be a quite common termination of the disease, and in a number of instances epilepsy has been found in patients who, from their hereditary predisposition, we might expect to have chorea. My father, who was acquainted with choreic families on Eastern Long Island, possibly the same that Huntington observed, states that hereditary insanity was common there, and that certain individuals in choreic families became insane without having chorea.[1]

The treatment of this disease therapeutically is as unsatisfactory as our knowledge of its pathology. Hygienic measures and systematic training may postpone or prevent its development in a person predisposed to it, but after it has once made its appearance its march is constantly forward, and nothing can stop its progress but death. Sinkler prescribed large doses of hyoscine and arsenic, and thinks for a time the movements were less severe, but admits "there was no material benefit done." In the treatment of my patients I have not attempted to cure or ameliorate the twitching of the muscles. I rest content in remedying, so far as I am able, any intercurrent malady or functional irregularity which may be present, and leave the unfortunate being to await his final cure from more skilful hands than mine.[1]

MEDICAL PROGRESS.

Rapid Cure of Erysipelas.—In the discussion which followed the reading of a paper on "The Use and Misuse of Disinfectants and Deodorizers in Medicine," by Dr.

[1] My father's native town of East Hampton, Long Island, was settled as early as 1649, and choreic families have lived there for generations. Previous to 1800 there were several emigrations from the town to eastern and northern locations, one of these being to the western shores of Lake Champlain, near Plattsburg; another to the Mohawk Valley in Oneida County; another to Delaware County; and a fourth one to some place in Vermont. It is interesting to note that Dr. Waters's observations were made upon patients living at Franklin, Delaware County; two of the three cases given by Lyon were in "New York State," town and county not given; Huntington's cases were on "Eastern Long Island;" and Sinkler's first patient was "born in New York State." The father of my second patient came from Vermont, town unknown, and the parents of my present patient came from Oneida County, New York. One of Lyon's cases was in Connecticut, only a short distance by water from Long Island, and Sinkler's second case was in Wyoming County, Pa., only seventy-five miles from Delaware County, N. Y. My first choreic patients were of Welsh descent, the great grandfather (who afterward had the disease) coming from Wales and settling in Vermont. He afterward moved to Plattsburg, N. Y., and still later came to Western New York. All the other cases reported have been in Europe. Possibly, if we were in possession of the complete ancestral history of our patients, we could trace all the cases of the disease in this country, except my first case, to one centre of origin at East Hampton, Long Island. Or is this coincidence merely accidental?

[1] I append a chronological list of papers which have appeared with references where they may be found:

Waters, 1841. Dunglison's Practice of Medicine, third edition, vol. ii. p. 216.
Lyon, 1863. American Medical Times, December 19.
Huntington, 1872. Medical and Surgical Reporter, April 13.
Landouzy, 1873. Soc. de Biologie.
Ewald, 1884. Zeitschr. f. klin. Med., Bd. 7.
King, 1885. New York Medical Journal, April 25.
Peretti, 1885. Berliner klinische Wochenschrift, Nos. 50 and 51.
King, 1886. Medical Press of Western New York, December.
Oppenheim. Berliner klinische Wochenschrift, xxiv. 309.
Huber, 1887. Virch. Arch., c. viii. S. 267.
Leppilli. Rev. di freniat, xiii. 453.
West, 1887. British Medical Journal, February 26.
Zacher, 1888. Neurolog. Centralbl., No. 2.
Zacher. Neurolog. Centralbl., vii. 34.
Hoffmann, 1888. Virchow's Archiv, iii. 3, 513.
Launois, 1888. Revue de Méd., August 10.
Sturges, 1888. Lancet, ii. 605.
Sinkler, 1889. Journ. of Nervous and Mental Diseases, February.

Sée has also written on the subject, but I cannot give reference to his paper.

Abstracts from the papers of Ewald, Huber, Zacher, and Hoffmann have been published in the American Journal of the Medical Sciences.

Henry Jackson, in the Suffolk District Medical Society, DR. J. C. WHITE took exception to the reader's statement regarding our lack of control over erysipelas. He said:

"I would like to state that I consider that one may get absolute control over erysipelas generally within three days by simple treatment. Of one hundred cases of ordinary facial erysipelas treated I should not expect more than three that would not yield within three days, very likely within forty-eight hours with the simplest antiseptic treatment. My custom is always to treat cases of that sort by the application during alternate hours of the day and evening of a mild solution of carbolic acid in alcohol and water as an evaporating lotion. It is only in very exceptional cases that the disease is not almost completely under control, and has disappeared within forty-eight hours; but after three days it would be extraordinary if by this means every vestige of the disease had not disappeared. This has been my only treatment in erysipelas for many years. I have never known it to fail. I have never given a drop of medicine internally. I feel that I have absolute control over the disease. I am speaking now of ordinary erysipelas, not of the deep-seated phlegmonous erysipelas, of course."

When asked the strength of the solution used, Dr. White gave the following formula:

℞.—Cryst. carbolic acid . . . ʒss.
Alcohol } . . . . āā ʒjv.—M.
Water }

—*Boston Medical and Surgical Journal*, June 13, 1889.

Peculiar Nervous Affection of the Upper Limbs.—In the *Nouvelle Iconographie de la Salpêtrière* just issued, M. PAUL BLOCQ describes an affection which is characterized by symmetrical atrophic paralysis, with disorder of sensation exactly corresponding to the musculo-cutaneous distribution of the ulnar nerve. In these characters the affection resembles amyotrophy of cord and nerve origin and primary myopathy, as well as amyotropic lateral sclerosis. It is an affection which runs parallel with a similar lead neuritis of the musculo-spiral nerve. What, then, constitutes its peculiarity? That there exists a group of such cases, having no very obvious cause, is, perhaps, sufficient to warrant a separate clinical class being established. Cases of the kind have followed typhoid fever, and very likely have been due to neuritis. Eleven years ago, in the *Archives Générales de Médecine*, M. Panas recorded a case of ulnar paralysis in one nerve supervening twelve years and a half after a fracture of the elbow on the same side. In the groove at the inner side of the elbow the ulnar nerve developed a fusiform swelling which led to the formation of a typical "main en griffe," interosseal atrophy, and disturbed sensations, with diminished tactile sensibility in the ulnar distribution. The symmetry of the peculiar affection described by Blocq is an additional feature of the disease, and, though it recalls diseases due to lesions about the lowest part of the brachial enlargement of the cord, still this symmetry alone cannot be taken as evidence of the situation of the lesion. For example, lead was long thought to exercise a special primary influence over the motor nerve-cells of the anterior cornua of the spinal cord, until it was proved that it had a great affinity for the distal extremities of these cornual cells, producing a peripheral neuritis rather than a myelitis.—*Lancet*, June 8, 1889.

Treatment of Amenorrhœa.—DR. NISALO, in the *Gazette de Gynécologie* for June, 1889, gives the following formulæ for the treatment of amenorrhœa:

℞.—Decoction of barley . . ʒxiij.
Mucilage . . . . ʒv.
Water of ammonia . . gtt. xl.—M.

The above is for vaginal injection, and should be used four times daily, simultaneously the following should be given internally in three doses.

℞.—Absinth water . . . ʒjv.
Syrup of saffron . . . ʒj.
Orange-flower water . . ʒss.
Castor oil } . . . āā gtt. ij.—M.
Savine oil }

Treatment of Senile Pruritus with Salicylic Preparations.—PROF. BESNIER, of Paris, advises the following treatment for senile pruritus: The entire body should be washed every evening with a quart of warm water, to which about two drachms of the following solution have been added:

℞.—Carbolic acid . . . . . ʒj.
Aromatic vinegar . . . . fʒvij.—M.

Then either of the powders given below should be dusted over the body:

Salicylate of bismuth . . . ʒv.
Starch . . . . . ʒiij.—M.

or,

℞.—Powdered salicylic acid . . . ʒiij.
Starch . . . . . ʒiij.—M.

Antipyrin in Diabetes.—At the last meeting of the Académie de Médecine of Paris, reported in part in the *Wiener klinische Wochenschrift*, May 30, 1889, DR. PANAS spoke of the beneficial results which he had observed to follow the use of antipyrin in diabetes. In several cases there was a complete disappearance of sugar from the urine after five or six days' treatment. Panas concludes that daily doses of forty-eight grains of antipyrin promptly check the formation of sugar.

Some authorities are of the opinion that the effects of antipyrin is only temporary. GERMAIN SÉE says that out of eighteen cases of diabetes in which he has tried the drug, he considers it most efficient in all cases in which there is no cachexia or tuberculosis and in which the quantity of sugar in the urine does not exceed two and a half or three ounces to the quart. Besides its action in reducing the quantity of sugar, it also relieves both the nervous and skin affections attending the disease. It has no beneficial effect upon albuminuria.

DR. A. ROBIN, of Paris, asserts that the use of antipyrin does away with the necessity for strict dietary measures. In cases in which it does not cause a rapid decrease in the quantity of sugar, Robin discontinues its use. He not only measures the daily percentage of sugar, but also the quantity and specific gravity of the urine. If the quantity decreases and the specific gravity remains stationary, he continues the use of the drug. In cases, however, in which its use causes a decrease in the quantity and an increase in the specific gravity, he considers its use most inadvisable. Albuminuria need not

be regarded as a contraindication for its use, although additional caution is advisable. If symptoms of weakness, loss of flesh, loss of appetite, pallor of face, oppression, etc., manifest themselves, the continuance of the drug will do more harm than good. Robin gives forty-eight grains *pro die* for ten or twelve days, but only thirty-two grains when albuminuria exists. He combines antipyrin with alkalies, preferably with bicarbonate of soda (one part of the latter to two of antipyrin), and gives four doses daily.

DUJARDIN-BEAUMETZ and WORMS both claim that antipyrin in conjunction with quinine, as well as with other antipyretics, speedily lessens the quantity of sugar in the urine of diabetics.

Methacetin, a New Antipyretic.—Methacetin is a derivative of amido-phenol; properly speaking, it is the methyl-ether of amido-phenol. The drug is a flaky powder, of a light-red color, odorless, and has a slight salty bitter taste. It melts at a temperature of 260° F., is soluble in cold water, but more quickly so in warm water, dissolves rapidly in alcohol. When given to animals in small doses it produces a rapid decrease of temperature, and also has a marked effect upon the nervous system. Fatal doses in rabbits were forty-seven grains. The urine contained no hæmoglobin. Experiments upon children show that small doses (three grains to four and a half grains) produce a considerable fall of temperature. Profuse perspiration frequently follows the use of the drug, and in one case collapse has been noted. Other accompanying symptoms have not been observed. The value of this new antipyretic is still undetermined.

Treatment of Chilblains.—The following formulæ, for the treatment of chilblains, are quoted from the *New York Medical Record* of June 8, 1889:

I. ℞.—Chloride meth. . . . ʒij.
Hydrochlorate of cocaine . grs. viij.
Compound camphor liniment ʒiij.
Soap liniment . . . ʒv.—M.

II. ℞.—Belladonna liniment . . ʒij.
Aconite liniment . . . ʒj.
Carbolic acid . . . ♏vj.
Flexile collodion . . . ʒj.—M.

III. ℞.—Castor oil
Flexile collodion } . āā ʒjv.—M.
Spirits of turpentine

IV. ℞.—Spirits of camphor
Tincture of opium } . āā ʒij.
Carbolic acid . . . grs. xl.
Alcohol . . . . ʒjv.
Water . . . . . ʒjv.—M.

Cocaine Injections in Spastic Articulary Contractions.—In primary inflammatory contractions of the joints, in such cases, therefore, where a contraction of the joint has been the immediate result of an inflammatory irritation or an inflammation of such a part, DR. LORENZ, in the *Centralbl. für Chirurgie*, June 8, 1889, strongly advocates the use of cocaine injections at the seat of the contraction. For this purpose Lorenz uses a Pravaz syringe with a long needle and injects a half or even a whole syringeful of a ten per cent. solution of cocaine into the contracted joint. The injection is always immediately followed by a cessation of pain, and in a few minutes the limb may be extended, fixed in proper position, or extension applied. This treatment is particularly useful in the straightening of spastic flatfoot. Children endure cocaine very well; when used in adults great caution is necessary, and very small quantities of the drug will often have the desired effect. The injection should be performed under strict antiseptic precautions. At the Albert Clinic in Vienna, general anæsthesia is now never resorted to in correcting primary inflammatory contractions.

An Epidemic of Chorea.—Last summer, reports DR. LAQUER in the *Centralb. für Gynäkol.*, June 8, 1889, there was an epidemic of chorea in a girls' school in Schadenheim, Germany. The disease started in a girl who, two years previously, had had an attack of chorea minor. The symptoms constituted clonic muscular twitchings of the face, trembling of the arms, and hemiparesis of both upper and lower extremities. The epidemic lasted for over a year and a half; in all, sixteen children were affected; Laquer ascribes the symptoms of chorea manifested to an hysteric origin.

An Emmenagogue Pill.—The following emmenagogue pill is recommended by *L'Union Médicale*, June 6, 1889:

℞.—Powdered valerian
Powdered saffron } . . āā grs. xxxj.
Black oxide of iron . . ʒj.
Syrup of absinth and powdered gum . . . . . q. s.

Make into forty pills. At first one pill should be taken at every meal; later, the dose may be increased to two pills. The prescription is specially valuable in establishing normal catamenia in young chlorotic subjects.

The Mechanical Treatment of Erysipelas.—It is only fair to the profession that, when a new therapeutic method is being recommended, the author should take equal pains to record all cases in which his treatment has failed as well as those in which it has proved successful. With this honest end in view, DR. ANTON WÖLFLER, in the *Wiener klin. Wochenschr.* of June 6, 1889, after describing his method of treating erysipelas, starts out with reporting two cases in which the treatment was unsuccessful, but follows with the report of three successful cases.

Dr. Wölfler's mode of treatment is to outline the area of the disease with strips of sticking-plaster, and he has found that the disease will not overreach these limits. In a case of erysipelas following an ulcer of the arm, strips of plaster were placed about the wrist, and, as the subaxillary glands seemed already affected, the second strip was placed over the shoulder and along the sides of the thorax, and the limits were completed by a third strip at the waist. The disease progressed, accompanied with fever, until it had reached the sticking-plaster, but went no further, the fever ceased, and rapid healing followed. Another case recorded was that of erysipelas following a leg ulcer. Two bands of adhesive plaster were placed around the thigh. The disease quickly extended to the first band, and a very slight inflammation extended beyond it, but did not reach the second band.

So soon as the course of the disease was checked, fever disappeared and rapid healing followed. The third case was one of facial erysipelas. A strip of plaster around the neck quickly checked the progress of the disease, and cure followed. Of the two unsuccessful cases, the first was one of gangrenous erysipelas of the thigh and pelvis, and the patient was in a dying condition when brought under treatment. Death occurred in twenty-four hours. The second was a case of erysipelas of the chest following an operation for empyema, although the disease did not go beyond the limits of the plaster strips, yet the patient was so enfeebled death occurred three days after the commencement of the treatment. In the number of the above mentioned journal for June 14th, Wölfler reports seven additional cases, all of which resulted favorably. Three cases were erysipelas of the extremities and four were facial erysipelas, the latter being controlled by plaster bands around the neck.

A new Formula for the Administration of Cod-liver Oil.—The *Lyon Médical* gives a new method of administering this drug. Equal parts of the oil and lime-water are mixed, and a milky liquid is obtained, which has no odor and is of the consistency of syrup. It can be flavored if desired with a little essence of citron or vanilla. The oil, thus saponified, is most pleasant to take, does not adhere to the walls of the buccal cavity, and leaves no disagreeable after-taste. It can be given in cases with the most delicate stomach. The mixture keeps well.

A Case of Death following Suspension.—In the *Lyon Médical*, No. 20, we read of the following case of death following suspension, reported by DR. GORECKI. The patient was a man, aged forty, who for five years previously had been suffering from tabes, and who, after reading of the excellent results obtained by suspension, bought an apparatus. The disease had taken a very rapid course in him, paraplegia being almost complete. He was suspended two or three times daily by his man servant. The first seven suspensions were followed by most marked improvement, and the patient was able to walk a few steps. After the eighth suspension he suddenly lost the power of speech and hearing, his sight, however, being unaltered and no paralysis existing. Although active treatment was immediately resorted to, swallowing soon became impossible, sight was lost, and general paralysis quickly set in. The symptoms became more and more aggravated, and in twenty-four hours the patient was dead; the immediate cause of death being asphyxia.

Preventive Treatment of Megrim.—DR. HAMMERSCHLAG, says the *Weiner med. Presse*, June 2, has used the following formula in warding off attacks of megrim with great advantage. So far, it has not failed him in a single instance:

℞.—Citrate of caffeine . . . grs. xv.
Phenacetin . . . . grs. xxxj.
White sugar . . . . grs. xv.—M.

Make into ten powders in capsules. Sig. One capsule to be taken between the attacks.

Phenacetin alone is not so efficacious. The treatment may be continned until the attacks cease, which, however, will not be long.

Post-partum Irrigation with Hot Water.—The question of post-partum irrigation is one which has of late been widely discussed, but has by no means been definitely settled. Whilst, on the one hand, the majority of practitioners are in favor of this procedure, yet there are a vast number that maintain that it is valueless, and are especially opposed to the use of corrosive sublimate or carbolic solutions, this on account of their toxic properties. It has, however, been definitely proved that the lochia of healthy lying-in women does not contain either streptococci or other pyogenic bacteria. With this point in view, DR. DEIPSER, in the *Centr. für Gyn.*, June 1, 1889, strongly recommends the use of simple hot water douches. He claims that the temperature of the water which he uses is not conducive to the growth of germs, and even if all are not killed, the stream will wash them away, together with the blood-clots. Deipser lays particular stress upon the hemostatic properties of hot water. Nothing, he says, causes a more rapid contraction of the uterus. His method is to raise the back slightly, so as to facilitate the running off of the liquid, and the douche used is of a temperature of 122° F. As this heat will be unpleasant to the external organs, although well borne by the internal ones, Deipser suggests that the former be covered with a small quantity of vaseline. The quantity of the douche should be about one quart, and it should be undertaken as soon as the placenta has come away, and while the cervix is still open.

Eschscholtzia California.—The Esohscholtzia California is a shrub-like plant indigenous to North America and especially to California, where numerous varieties are found. A resinous, dark-green extract is obtained from the plant, which is entirely soluble in alcohol, soluble to a great extent in water, slightly so in glycerine, but insoluble in either chloroform or ether. The watery extract is of a red-brownish color and is soluble in water, alcohol, and glycerine, but not in ether or chloroform. BARDET and ADRIAN succeeded in isolating a base from the plant which they take to be morphia; an alkaloid was also obtainable in large quantities. The alcoholic extract was experimented with upon animals, and also tested in thirteen cases, and it proved itself to be a valuable and safe hypnotic and analgetic. The doses given varied from forty minims to two and a half fluidrachms. The following formulæ were found most agreeable:

I.

℞.—Alcoholic extract of eschscholtzia ♏xxx to fʒijss.
Rum
Simple syrup } . . . āā fʒj.—M.

II.

℞.—Alcoholic extract of eschscholtzia fʒvss.
Powdered liquorice root . . q. s.—M.

Make into forty pills. Sig. Five to ten pills daily.—*Deutsche med. Wochenschr.*, May 30, 1889.

Treatment of Habitual Constipation with Electricity.—DR. HAMMOND, says the *Revue de Thér. Médico-Chir.* of June 1, 1889, has successfully treated forty-one cases of habitual constipation with a galvanic current. The negative pole is placed in the anus, and the positive pole applied to the abdomen. Faradization was found useful in promoting a healthy tone of the muscles of the abdomen. In connection with the treatment, saline aperients should be administered.

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SATURDAY, JULY 13, 1889.

EXTERNAL SOURCES OF INFECTION IN RELATION TO PREVENTIVE MEDICINE.

IT is the grand object of preventive medicine to investigate the conditions out of which diseases spring, and to endeavor to discover, so far as possible, how far they are removable and how far they are preventable. In this broad field of inquiry the science of bacteriology has yielded most valuable results. Through the exact methods of investigation which have been applied to the discovery of external morbific agents we are in possession of knowledge of the greatest advantage in forming a clearer conception of the causes of important infectious diseases, which knowledge is indispensable in selecting and applying the measures of prevention. Exactly what is the present state of our knowledge with respect to the external sources of infection in their bearing on preventive medicine is a question for profitable consideration. The profession is indebted to DR. WELCH for the able manner in which he has traversed this question in his Address in State Medicine, delivered before the American Medical Association at its recent meeting at Newport, and printed in this issue of THE NEWS.

It is not the purpose of Dr. Welch to enter into an elaborate discussion of the etiology of individual infectious diseases, but rather to consider "what *rôle*, in harboring and transporting infectious agents, may be played by those substances or media with which we necessarily come into intimate contact, such as the air, the ground, the water, and our food."

The air is a common medium for the transportation of infectious agents, but the danger from this source has been overestimated. Unlike the soil, the air does not form a resting or breeding-place for bacteria. Bacteria may adhere to particles of dust, but they do not exist to any great extent in the air in single detached particles. The air bacteria are derived from the ground, and in order to be taken up by the air they must first become dry. This fact is of great significance in the application of measures for the prevention of infection through this channel. The indications which it suggests are the necessity of guarding against the desiccation, when exposed to the air, of substances which contain infectious germs not destroyed by drying and free ventilation.

A most important source of external infection is the ground. Unlike the air, the ground is the resting or breeding-place of numerous forms of microorganisms, some of which are pathogenic. It is in the superficial layers of the soil that bacteria flourish. Among the pathogenic microörganisms which find their habitat in the ground, are the bacilli of malignant œdema and of tetanus. In favorable situations the bacillus of typhoid fever, of anthrax, and of cholera, may have their abiding-place there, and, under suitable conditions, multiplication of these germs may take place. The tubercle bacilli may also preserve their vitality in the soil for a long period under specially favorable conditions. The soil, however, is not a favorable breeding-place for most of the infectious bacteria.

Bacteria derived from the soil may be introduced into the body, conveyed on currents of air, only when the surface is dry. They may also be conveyed by means of vegetables, by the intervention of domestic animals, by the medium of flies and other insects, and in various other ways. The most important medium, however, is drinking-water, which becomes charged in various ways with these morbific agents.

In preventing infection, directly or indirectly, from the ground, it is of first importance to prevent the pollution of the soil by infectious substances. One means to this end is the adoption of a perfect system of drainage, whereby substances which favor the existence of infectious germs are kept out of the ground. Another means is thorough cleanliness about habitations. In cities, the proper paving of

the streets, absence of unnecessary disturbance of the soil, cleanliness of streets and spaces, and the laying of dust by sprinkling, are important in preventing infection from the ground and dust.

Another vehicle of infection is water. Bacteria abound in water, and even pathological bacteria may preserve their vitality for a length of time in this medium, if they do not actually multiply. So far as our knowledge goes, drinking-water is not a favorable breeding-place for pathological microörganisms. Still, there is no reason for rejecting the belief that both cholera and typhoid fever are conveyed by this medium. Infection from water is to be prevented by avoiding water suspected of infection. When this is not possible, the suspected water should be boiled. The only means of purification of surface water on a large scale is filtration. Domestic filtration is unsatisfactory, but filtration of the general supply, by means of large sand-filters, furnishes excellent results.

Still another medium of infection is our food. Many articles of food form excellent nutritive media for the growth of pathogenic microörganisms. Infection of food may be derived from deposits of dust, from earth, from water used in its preparation, and from contact in various other forms with infection. Milk is particularly liable to convey infection. There may be produced in it, as well as in other forms of food, by bacteria incapable of multiplying in the body, certain organic alkaloids, the so-called ptomaines, which produce poisoning and render the alimentary membrane more susceptible to infection by morbific organisms.

Articles of food may be primarily infected. For example, the milk from tuberculous cows and the flesh of animals infected with parasites. The measures of prevention are obvious. The cooking of food immediately before its use, the boiling of milk when the supply cannot be carefully controlled, and the application of efficient sanitary inspection of all food supplies, form the basis of preventive measures.

We have very hastily and imperfectly sketched the leading points in Dr. Welch's address, which is a fresh and instructive article, full of practical suggestions, and worthy of careful study.

OWING to a reduction in the appropriations, three of the National quarantine stations on the Atlantic coast, one in the Gulf and two on the Pacific coast, will be closed on the 1st of October. The governmental appropriation amounts to $50,000, and as this amount is insufficient to maintain all the stations now in operation throughout the year, two only will be kept open, namely, the one at San Francisco and one on the Gulf coast.

AT the recent annual meeting of the Rhode Island Medical Society, the following officers were elected for 1889–90:

President.—John W. Mitchell.

Vice-Presidents.—William H. Palmer, Robert F. Noyes.

Recording Secretary.—William R. White.

Corresponding Secretary.—George D. Hersey.

Treasurer.—George L. Collins.

Dr. G. L. Collins, Secretary of the Trustees of the Fiske Prize Fund, read the annual statement of the same.

A prize of $250 had been awarded to Dr. Charles V. Chapin, of Providence, for his essay bearing the motto "Their Poison is like the Poison of Serpents," the subject being "The Rôle of Ptomaines in Infectious Diseases."

For 1890 a prize of $300 is offered for the best essay on either of the following subjects:

1. Pathology, diagnosis, and treatment of intracranial tumors, with original observations.

2. How far can disease be prevented by science and legislation?

3. The surgical treatment of wounds and obstructions of the intestines.

THE *Lancet*, of June 29th, states that the University of Oxford, in recognition of his accomplishments in medical literature, and of important services otherwise rendered, is about to confer upon Dr. J. S. Billings, of the American Army, and now attached to the Surgeon-General's Office, Washington, the honorary degree of D.C.L.

DR. HENRY M. HURD, Superintendent of the State Hospital for the Insane at Pontiac, Michigan, has accepted the position of Superintendent of the Johns Hopkins Hospital at Baltimore.

A CONVICTION, under a new law in New York State prohibiting the selling of cigarettes to children under sixteen years of age, has been obtained. The offender was compelled to pay a fine of fifty dollars. This case may be appealed by the conjoint action of the dealers and manufacturers, but this conviction

will diminish to some extent the pernicious use of tobacco by young persons.

AN atrocious outrage upon a country physician was perpetrated on the night of July 1st, at a village called Pleasant Unity, in Westmoreland County, Pennsylvania. Dr. Lewis T. Smith, a graduate of Jefferson and a practitioner of excellent repute, was beaten and nearly murdered by three masked men, who aroused him at night on a pretence that one of them needed to have a tooth extracted. They gained access to the house in this manner, and proceeded to beat the inmates and to ransack the premises. They found money and valuables to the amount of five hundred dollars, which they took away with them, leaving the physician, to all appearances, dead. Dr. Smith's injuries did not prove fatal, but his condition is even yet most critical. There is some hope, however, that he may recover.

DR. STEPHEN WICKES, one of the oldest and most respected physicians in northern New Jersey, died on the 8th instant at his home in Orange, N. J.

Dr. Wickes was born in Jamaica, L. I., March 17, 1813. He was a descendant of Thomas Wickes of the Massachusetts Colony of 1635, his father being Col. Van Wyck Wickes. Having graduated from Union College in 1831, he became a student of the natural sciences at Rensselaer Polytechnic Institute in 1832, and of medicine at the University of Pennsylvania in 1833–34, and in the latter year was graduated from that institution. In 1835 he practised in New York, thence until 1852 in Troy, and from 1852 until February, 1886, in Orange. He was for twenty years an elder of the First Presbyterian Church.

Dr. Wickes will be best remembered by his literary work, to which he applied himself with great industry after his retirement from active practice. He edited the *Transactions of the Medical Society of New Jersey* from 1860 until 1882; also the old *Transactions* of the Society from 1766 till 1858. He published *Topography of Orange; Water Cure in Orange; Memoirs of Thomas W. Blatchford, M.D., of Troy, N. Y.; Living and Dying, their Physics and Psychics; History of Medicine in New Jersey; Sepulture, its History, Methods, and Requisites*, and *History of the Newark Mountains.*

DR. WILLIAM ELMER, an ex-President of the New Jersey State Medical Society, died at Bridgeton on the 26th of June, after an illness of several months, due to Bright's disease. He was the third of a line of physicians in the Elmer family. His grandfather, Dr. Jonathan Elmer, was also a President of his State Society in the year 1787, and in 1788 a United States Senator. Dr. William Elmer was educated at Princeton College, taking the salutatory oration at graduation. He took his M.D. at the University of Pennsylvania in 1836. After a year or more at Blockley, he settled down at Bridgeton in 1838, and rapidly succeeded in practice. He was a leader in medicine not only, but in charitable, educational, and religious organizations in the southern part of Jersey. In 1860 he was in the presidency of the State Society, and his age at death was nearly seventy-five years.

DR. PHILIP F. BRAKELY, who for forty years was the Secretary of the Medical Society of Warren County, New Jersey, died at his home in Belvidere, at the age of seventy-five years, on the 3d of July. He was a representative man in northern New Jersey, just as Dr. William Elmer, who died six days before him, was a most able standard-bearer in the southern section of the State. They both were graduates of the University of Pennsylvania, Dr. Brakely being of the class of 1842. He was early identified with the American Medical Association, and a permanent member of the State Society. His death has been ascribed to the infirmities of advancing age, culminating in cardiac syncope.

SOCIETY PROCEEDINGS.

AMERICAN MEDICAL ASSOCIATION.

Fortieth Annual Meeting, held at Newport, R. I., June 25, 26, 27, and 28, 1889.

(Specially reported for THE MEDICAL NEWS.)

SECTION OF SURGERY.

WEDNESDAY, JUNE 26, 1889.

DR. C. B. PORTER, of Boston, read a paper on

ECTROVERSION OF THE BLADDER.

He first reviewed the more important forms of ectroversion together with the leading operations that have been proposed for its relief. He then gave a history of several cases and reviewed the statistical history of the various operations. With regard to choice of operation, he thought age and the direction of the cleft were the chief factors. No operation has yet secured retention of urine. The operation is not a serious one. None of his four cases had died. Crudelli's operation promises nothing more than the flap-operation. The flaps must be taken from the middle and lateral portions of the

anterior abdominal wall and must be about a third larger than enough to cover the cleft. They must be so made as to secure free circulation of blood in them. Traction must not be made on them. All hemorrhage must be promptly arrested. If delay occurs in the operation, the field must be carefully covered with hot wet flannel. The operation should be made early and no fear need be entertained of closing the cleft. It has been successfully performed at as late an age as forty years. At the close of his paper he exhibited a case upon which he had operated, giving a complete history of the case and method pursued.

DR. W. T. BRIGGS, of Nashville, then read a paper on

THE CHOICE OF OPERATIONS FOR THE REMOVAL OF URINARY CALCULI.

He stated that there is no *best* operation; every case of calculus has its special indications, and the surgeon will have the best results who has the best knowledge of all methods of operating and can select the operation which is best adapted to the case. The age of the patient; the size and hardness of the stone; the frequency of recurrence; the condition of the urinary organs, and the results following different methods are the chief factors for the selection of a particular plan in any given case. The age of the patient is important. The average rate of mortality in children is generally given as one to sixteen. In his practice, seventy-one cases operated by the bilateral method resulted in recovery. He saw no benefit in the substitution of litholapaxy. In advanced age every method is more fatal owing to enfeebled strength and increased size of stone. He had, however, operated successfully on seven old men.

The character of the stone is an important factor in the choice of operation. If the stone is small crushing should be resorted to; but statistics show that return of the calculus is more frequent after crushing than after lithotomy. It is asserted that litholapaxy is more thorough in clearing the bladder of débris, but this has not been settled and cannot be definitely settled until more thoroughly reliable reports have been collected.

The state of the urethra, bladder, and kidneys must be determined. In considering the urethra, with a view to litholapaxy, it must be determined how far it will admit instruments. Every operator knows the damage that may be done by starting up inflammatory action in the urethra, and the method should be selected which is least likely to roughen or irritate that passage. The condition of the prostate gland must also receive the careful attention of the surgeon. As long as it is normal in condition and there is no enlargement of it to interfere with the introduction of instruments, the crushing operation may be selected; but if it is enlarged or if it is the seat of a tumor, the cutting operation must be resorted to. The bilateral incision in these cases is often followed by diminution of the size of the gland and a re-establishment of the power of micturition.

In diseased conditions of the bladder, the choice of operation must depend upon the extent of the pathological changes which are present in the viscus. If the condition is not excessive, crushing may be resorted to, with good prospect of good result; but if inflammation has been started, with diminution of the calibre of the bladder, cutting should be chosen, no matter how small or how soft the stone. When pathological changes in the kidney have made much progress, all operations are fraught with danger, and the surgeon should be content with making the last days of the patient as comfortable as possible. When all these things are negative, the environments of the patient should decide the choice of operation. The method should be the one which will best remove all distressing symptoms and render the patient most comfortable.

Of the cutting operations he preferred the medio-bilateral, because

1. It opens up the shortest and most direct route to the bladder; passing from a third of an inch anterior to the verge of the anus to the neck of the bladder, it facilitates the introduction of instruments and the extraction of the calculi.

2. It divides parts of the least importance. The incision following the median line does not encounter any structure of importance, nor does the slight bilateral section of the deeper parts do violence to tissues of vital consequence.

In adult life the death-rate alters somewhat in favor of litholapaxy. As the prostate and urethra enlarge and the parts about the neck of the bladder become more vascular, the danger incident to cutting through them increases. On the other hand, the increase of size makes the performance of litholapaxy comparatively easy and safe. In old age the dangers attending all the cutting operations have increased greatly, but the mortality after litholapaxy is very little higher than it is earlier in life.

The rule in childhood seems to be, litholapaxy for small and medium-sized stones; lateral lithotomy for all above this except for very large stones which must be extracted by the suprapubic operation.

The following conclusions were stated:

1. No operation is adapted to all cases.

2. Litholapaxy is incomparably superior to lithotrity and should always be practised in suitable cases.

3. The suprapubic operation should be chosen for the removal of very large and hard stones.

4. The medio-bilateral operation should be chosen in all other cases.

DR. A. T. CABOT, of Boston, then followed with a paper on

THE CHOICE OF OPERATION FOR STONE IN THE BLADDER.

He thought litholapaxy the choice of operation for stone in most cases. It was therefore his object to consider the objections which have been held against it and to enter upon the discussion of its strong points. German writers have objected that a certain amount of skill is requisite to the performance of the operation. It might be urged with equal propriety that any surgical procedure requires a certain amount of skill in operative procedures. In many of his arguments he coincided with the views expressed by Dr. Briggs. In speaking of the relative mortality of the operations he exhibited a table of statistics which he had prepared from the death-rates attending the methods of extraction. From it he concluded that in childhood there is little of choice between lateral lithotomy and litholapaxy. The death-rate in each is a little over three per cent. In adult life litholapaxy has a slightly lower death-rate than lithotomy. Suprapubic lithotomy keeps its place as a little

more dangerous operation. In old age the danger of cutting is greatly increased.

It is exceptional to see loss of function of any kind follow the cutting operations for stone; after litholapaxy no such loss should occur. The possibility of wounding the seminal ducts by incision through the floor should be considered. The lateral incision has the advantage that while giving more room for the extraction, it wounds at least only one duct. Incontinence is an occasional result of perineal sections owing to their interference with both sphincters of the bladder.

In conclusion, he said that in childhood the mortality after crushing is small; that of litholapaxy and lithotomy is about equal. The crushing operation has the advantage in that it does not wound any of the ducts or seminal vesicles, or rectum. The urethra and bladder of a child will tolerate a considerable amount of irritation. For stones too large for the crushing process, however, we must resort to bilateral lithotomy, and for those too large for this method to the suprapubic. Conjoined manipulation will generally enable us to determine the size of the stone. The character of the stone with regard to firmness may usually be determined by the sensation which it imparts to the sound.

Strictures have generally been named as a contra-indication to the operation of litholapaxy, but this is not usually the case, as the stricture will generally yield sufficiently to dilatation. Enlargement of the prostate may, however, render the operation dangerous.

DR. DUDLEY P. ALLEN, of Cleveland, read a paper on

LITHOLAPAXY IN CHILDREN.

The operation has, he said, come to be regarded as justifiable for the removal of calculi in children, and great results have been achieved by it. Lateral and suprapubic lithotomy have their fields of usefulness, and litholapaxy is rapidly becoming recognized as applicable to a certain class of cases. The essayist had received several letters from prominent foreign physicians expressing their views of the operation. G. Buckstone Brown, of London, and Guyon, of Paris, favored its use in children when suitable to the case. Petersen, of Kiel, Germany, and Kerr, of Canton, China, had not made use of the operation. Guyon considers the term litholapaxy a misnomer, since it presupposes the aspiration of the fragments to be the chief rôle.

The chief advantages claimed for the operation were:

1. The absence of a cutting operation, through the dread of which patients frequently delay operative measures until the stone has acquired a large size.

2. The short convalescence, averaging but a few days.

3. The absence of offensive discharge of urine into the bed and over the thighs of the patient, often producing very annoying and even dangerous consequences. The suffering is commonly very slight and confined to a few days. Patients will not hesitate so long before consenting to its being made, and even should recurrence be more frequent than after lithotomy, the secondary operation is much less to be feared, and of much less serious character. A boy's bladder is more likely to be suitable for the operation than is the bladder of an adult. Finally, the operation is especially adapted to the extraction of medium and small-sized stones. It is important that the instrument be as large as will be admitted, and that it be of good manufacture. The fragments should be removed with the fewest possible insertions of the evacuator. In conclusion, he expressed preference for suprapubic lithotomy for great and hard stones, but an operator of skill in litholapaxy would do well to choose it for those of small size.

DR. J. W. S. GOULEY, of New York, read a paper on

THE CHOICE OF TREATMENT OF URINARY CONCRETIONS.

Owing to the lateness of the hour, he omitted all that portion of his paper which referred to lithotomy. He described the various forms and methods of lithotrity. The operation was admissible where the stone was free and friable and of small size. It may sometimes be done in cases of large stone, or in cases of multiple stone. The urethra must be large enough, and the bladder must be tolerant of operative measures. It is not always applicable to cases of tumor at the neck of the bladder. Advanced disease of the bladder, kidneys, or urethra, contraindicates both lithotomy and lithotrity. In some cases a single operation occupying only two minutes was sufficient. Repeated short sittings he considered greatly preferable to a single prolonged sitting, on account of their less harmful effect on the mucous membrane of the bladder, and the less danger from the use of anæsthetics. Lithotrity at one prolonged sitting cannot with prudence be generalized. There are, however, surgeons who still prefer the operation at one sitting, notwithstanding the fact that the dangers are so much greater.

Litholapaxy is no longer a novelty, and may now be estimated at its right value. The great expectations of its advocates have not been realized, for they have discovered that the operation cannot always be terminated at one sitting; that it is not applicable to many cases complicated by urethral obstruction. They have found that in too many cases the injury to the bladder has led to cystitis and prolonged suffering.

Respecting lithotrity in children, he remarked that very little could be said. Several operators have performed the operation, and the conclusion was that it should be reserved for cases of small stone, in which the operation could be completed at one sitting. In cases where the stone is small and friable, weighing only a few grains, lithotrity is justifiable, but lithotomy is surely the safer operation in such cases. He concluded with the statement that the proper treatment of urinary concretions can be drawn only from a proper study of each case and of each method, there being no general rule as to the method that shall be employed in every case.

SIR JAMES GRANT, of Ottawa, said that stone in the vicinity of his residence was not of common occurrence, but he had operated a number of times. He very much preferred the bilateral method of operation to any other procedure. His operations had generally been performed in that way, and it was very seldom that he adopted crushing. He thought that the deductions of Professor Gouley embraced a large amount of good common sense. The difficulties attending lithotrity and its dangers are very great indeed. Unless it can be brought down to an exact measure, and unless it can be completed at one sitting, as in the case of small stones, it ought hardly to be performed at all. Not long ago he had met one of the most interesting cases he had ever encountered. He had a patient who had suffered from stricture, followed by fistulous openings through the perineum. Erysipelas set in, and a considerable portion of the tissue had

sloughed away. Retention and extravasation of urine ensued. He made an extensive incision, permitting the retained urine to escape freely. After a few days the slough separated, leaving an opening three-fourths of an inch in length in the membranous portion of the urethra. After applying large poultices, he observed that the granulations which sprung up were very extensive and pouting. He then thought that he would try the experiment of introducing the catheter into the bladder. In this he was unexpectedly fortunate, the instrument passing readily. Securing the catheter to the edge of the orifice, he retained it there three days, and treated the granulations with nitrate of silver. As a result he secured complete closure of the opening, and the patient was in a few days able to urinate *per vias naturales*. Systematic dilatation of the urethra was practised for a long time. An operation had subsequently to be performed, but the patient is now well.

DR. TREMAINE expressed satisfaction at the great progress which had been made in the last few years by suprapubic lithotomy. Five years ago, he said, this operation would not have been mentioned in the discussion of this question. To-day it had been named as an operation justifiable in certain cases by every speaker. He then reviewed the dangers which accompany the cutting operations for stone which reach the bladder through the perineum. One of the most important, and one which is too often entirely disregarded, he said, was that of impotence. As evidence of this he referred to eighteen cases of stone, all in young boys, which had been operated upon by a surgeon in Pottsville, Pa. The subjects of the operation have all since grown up, have married, and but one of them has become a father. While there were many other ways of explaining sterility, he thought that under the circumstances so large a number of successive cases argued strongly for its being due to the operation.

DR. GOULEY, in reply to an inquiry, stated that he thought the irritation of the bladder by the fragments of stone, which are likely to be left after crushing, is greatly exaggerated; that the fragments of the worst forms of stone, the pure uric acid calculi, the oxalate of lime stones, etc., do less harm than we are asked to believe. After a stone has been properly crushed—one of the worst forms of stone—it is broken into several fragments. The fragments cause some vesical irritation, no hemorrhage, no ulceration, unless they have been considerably disturbed after the operation. The result is a copious discharge of mucus from the mis-called mucous membrane of the bladder. This mucus very soon adheres to the stones and gives them a thick coating by which they are enabled to slip into the urethra and be discharged through it; so that the bugbear of angular fragments after crushing should not be thought of. Uric acid calculi pass very readily, as has been said, after repeated injections of alkaline fluids. They may sometimes be crushed by the finger in the rectum, a very old method of procedure for the extraction of stone.

DR. R. T. MORRIS, of New York, then read a paper entitled

WHAT DRESSING SHALL LIE NEXT TO THE WOUND?

In bringing the subject before the Section he stated that it was his desire to call attention to a point which is not mentioned by authors. What he would have to say applied alike to fresh wounds and to those undergoing repair and on which a bulky dressing could be placed. He did not doubt that his hearers all used the common antiseptic methods of dressing these wounds. The commonly used dressing of vaseline on any textile fabric was the worst form of dressing that could be applied to a granulating surface. The reason for this assertion was the fact that vaseline or any oil coming into contact with lymph prevents its coagulation, keeps the wound moist and favors decomposition and the growth of organisms. Second, when granulation cells are projected into the lymph they come into contact with the textile fabric and are projected into it. Lint and cotton dressings are even worse than textile fabrics. The perfect type of dressing on a fresh wound would be the same as that on a wound undergoing repair. Suppose that we have a wound that is undergoing repair: if we apply to it a dressing composed of any textile fabric, the connective tissue corpuscles and epithelial cells which form over it shoot up into the fibres of the textile fabric; if then for any reason the dressing has to be removed, we remove with it a large part of the new tissue, and thus the repair which has taken place is in a great measure destroyed. We must, therefore, use in these dressings some fabric which is not textile. Gutta-percha tissue will not altogether fulfil the requirements. Further than this, the moisture which collects under gutta-percha tissue has a disintegrating effect on the granulations and prevents their organization.

Lister's protective oiled silk is the only thing which can be applied to a wound without preventing its repair. The speaker went on so far as to affirm that if we have a blood-clot two inches in length by the same width covered by such a dressing, if fermentation does not occur, and if it is not injured in any way, it will become replaced by fibrous tissue. In large granulating surfaces we should first render the surface entirely aseptic by means of a ten to fifteen volume solution of peroxide of hydrogen; then apply immediately the protective oiled silk. Over this we may apply any absorbent dressing we may desire, absorbent cotton, etc.

DR. H. O. MARCY, of Boston, thought that while there was a great deal of value in what the last speaker had said, he did not think that it applied to operative wounds. He had of late applied no dressing at all after operations, simply closing the wound, drying the skin and applying over it a little iodoform with a few fibres of cotton over it to strengthen the dressing. In this way nature is left entirely to herself and agglutination goes on rapidly. He did not now use drainage tubes as he formerly did.

EVENING SESSION.

DR. J. COLLINS WARREN, of Boston, read a paper on

THE MANAGEMENT AND TREATMENT OF LARGE HERNIÆ.

He said that the large herniæ seem to have a *raison d'être*. In other words, the subject of the hernia usually suffers from some form of disability which prevents him from exercising that control over the hernial tumor which an intelligent and able-bodied person would exercise. In a large proportion of cases, particularly in women, obesity is a strongly predisposing cause. In the male, the subject is either a large middle-aged business man, so absorbed in his work, or of so callous a temperament as to

have neglected his disease until compelled to seek treatment through fear of permanent disability; or he is an old and feeble individual, or so obese as to be unable to effect a reduction of the tumor by manipulation, and to retain it in place by the proper application of a truss. We find large herniæ in children whose position in the social scale is so low that they cannot receive proper care. He narrated several cases illustrating each of the forms of cause referred to. In each case he had applied the treatment which the nature of the case seemed to demand. In none of the reported cases had a radical cure been effected, but the comfort of the patients had been secured.

DR. HENRY O. MARCY, of Boston, then read a paper on

THE RADICAL CURE OF HERNIA BY THE USE OF THE BURIED ANIMAL SUTURE.

Fourteen cases operated upon within the last eight months and illustrating every variety of hernia, and the essayist's methods of operating, furnished the text for this paper. Specimens of hernial sac were exhibited to demonstrate the changes which take place in the peritoneal layer. In old large herniæ the peritoneum was found so thickened and so blended with the surrounding cellular tissue as to be distinctly pathological and utterly devoid of value as an aid in the restoration of the protruded parts. He thought it clearly the duty of the surgeon to remove tissue thus changed. The operation performed by the speaker consisted in dissecting up the sac quite within the ring; then making the neck tense by traction, passing through it a double continuous suture, in the line of the oblique opening across the ring, and resecting the portion of the sac thus separated. The stump is then carried up within the internal ring which, in large and old herniæ, is almost completely closed from below upward by a double suture. In this manner the obliquity of the canal is restored, a point which the speaker considered of the utmost importance. The pillars of the ring are then brought together by a continuous suture extending to the outer margin of the external ring and encroaching closely upon the cord. The overlying tissues, and, finally, the skin, are approximated in the same manner, with a buried animal suture. This is accomplished by means of a running blind stitch connecting the deeper layers of the skin. By this means the essayist claimed the ring is restored, the tissues are held in proper relation, bleeding prevented, and no pockets allowed to remain for the accumulation of secreted fluids. Drainage is, therefore, unnecessary, and the wound after thorough irrigation with bichloride solution is dried and at once closed with iodoform-collodion. Repair goes on without pain, swelling, or even tenderness; opiates are rarely required. The speaker had operated about one hundred times for the relief of hernia, with, so far as he could determine by a recent examination of the traceable cases, about ninety per cent. of cures. The operation he considered without danger except in cases complicated by strangulation, where the integrity of the intestine has been impaired.

He expressed the belief that he had been the first American pupil of Mr. Lister. Soon after his return from Edinburgh he operated on a case, closing the ring in the manner described, because the patient was afflicted with a cough. The result was permanent cure of the hernia. The operation was soon repeated upon others. Being successful he began a careful comparative study of the behavior of animal ligatures incorporated in the living tissues, and found that they were replaced by vitalized connective-tissue cells. His discovery, the priority of which has never been questioned, he considered of paramount importance in all operative procedures, but particularly so in those for the relief of hernia. The essayist expressed his preference for sutures made from the tendon of the kangaroo's tail.

DR. JOHN B. DEAVER, of Philadelphia, under the title of

THE RADICAL CURE OF HERNIA,

described the various operations which have been proposed, including those of Macewen, McBurney, Baker, and Banks. From these he had devised an operation based chiefly upon that of McBurney, and differing from it chiefly in the fact that he permits the fundus of the sac to remain *in situ*. He preferred antiseptic silk sutures.

DR. CHARLES W. DULLES read a paper on

PROPERITONEAL HERNIA.

This, he said, is a subject but little understood in America, but three cases having been reported. One of these was his own, published in 1886, the second by Dr. Hartley, of New York, and the third by Dr. Torrey, of Brooklyn. A properitoneal hernia he described as one occupying an abnormal position within the abdominal or pelvic wall and in front of the peritoneum. In a true properitoneal hernia the tumor lies between the peritoneum and the overlying muscles, if abdominal, or between the peritoneum and the bones, if pelvic. There is also a form of hernia in which the protrusion occurs between the planes of the abdominal muscles, and another in which it lies outside of the muscles and just beneath the skin and superficial fascia. These cases are, for the most part, inguinal hernias in their inception, and are often accompanied by a testicle which had not descended. The obstruction offered by a truss, or the incarcerated testicle at some later period, causes the protrusion to be forced, under a strain, into one of the unusual directions described. Their position is usually above and parallel to Poupart's ligament, and they frequently lead to the production of a hydrocele of the cord. They sometimes become so large as to protrude beyond the ligament and to become pendulous, or extend upward and outward as far as the anterior superior spine of the ilium. Although the essayist had found the record of a case successfully treated by taxis, he considered this the most dangerous method of treatment, and preferred the cutting operation.

THURSDAY, JUNE 27TH.

DR. THOMAS K. MORTON, of Philadelphia, presented

SOME FURTHER CONSIDERATIONS AND STATISTICS OF ABDOMINAL SECTION FOR TRAUMATISM.

He considered of paramount importance the irrigation of the peritoneal cavity. Where there has been extravasation of the contents of the intestine into the peritoneum, irrigation and drainage are the two life-saving factors in closing this operation. The irrigation cannot be too copious; the water should be hot and plenty. If there are perforating wounds of the liver, spleen, kidneys, they should also be irrigated. A glass tube carried down into the wound in the organ would be an advantage. Washing out the stomach is often advisable, especially if the

wound has been received after copious eating and drinking, as is often the case. Rectal alimentation is important in cases where extensive repair of the intestine has been made. He then reported 110 cases which he had collected, with a mortality of 62, all but 16 of them being American. Four times the abdomen had been opened for gunshot wound, where no wound of consequence was found. All recovered. The statistics showed slightly better results for American operations than for foreign, because, as he thought, the operation is performed earlier in America than abroad. The essayist also recommended the use of hydrogen gas for the detection of wounds of the bladder in much the same manner as it is used by Senn for the discovery of perforations of the intestine.

DR. JOSEPH T. PRICE, of Philadelphia, then read a paper on

PELVIC SURGERY BY ABDOMINAL SECTION—ITS PAST, PRESENT, AND FUTURE.

Reference was first made to the early history of abdominal and pelvic surgery and the opposition which they encountered. He strongly favored thorough cleanliness in operations without the aid of any chemicals. Listerism has wrought death by means of chemicals instead of dirt. Delay is not conservatism. He referred also to the former custom of preparing a large collection of instruments for the operation of laparotomy, and the present small number that is considered necessary. Everything is now done to gain cleanliness and speed. The drainage tube, in itself an advance, has now given place to flushing by means of the gravity tube, and the speaker could not too strongly recommend its use. Hemorrhage from faulty tying of the pedicle is a great cause of death after the operation of ovariotomy. Investigation has led to the adoption of animal ligatures.

The treatment of incipient peritonitis is now the use of saline purgatives, or, if they are not well borne, small doses of calomel. Experience has shown that a violent peritonitis, almost or quite general, will yield to this treatment, even though the disease be due to septic cause. The opium treatment can give no such showing as this. The discovery of the dependence of pyosalpinx upon gonorrhœa has given to the latter disease in the female an importance which it never before had. From being looked upon as a trifling malady, it is known to be the cause of the worst form of disease to which the female is liable.

If there is any better treatment of pelvic troubles than the knife, we should look to it with pleasure. The essayist had not, however, much faith in electricity. It has been applied and lauded as a specific for almost every disease in nosology, but the results obtained from it are by no means so gratifying as promised. The essayist did not believe that one-fourth of the reported cases of its successful use as a fœticide had been cases of extra-uterine pregnancy, and many of them, he thought, were not even pregnancy of any form.

DR. J. M. BALDY, of Philadelphia, read a paper on

PERITONITIS.

He first referred to the inaccuracy of early statistics in reference to peritonitis. No safe deductions, he said, can be drawn from the records of post-mortem examinations in this disease more than a quarter of a century ago. With reference to the origin of the disease there was not a unanimity of opinion. That it was never of idiopathic development he was not ready to assert, but he could safely declare that every case that had come under his own observation had been of traumatic origin. The only way in which opium could hold its place in the reputation it had gained in the treatment of peritonitis was on the supposition that it was of idiopathic origin. In the treatment of the disease he recommended drainage and depletion. Our best channel for depletion is through the alimentary canal, and the best method of securing it is by means of large doses of saline cathartics. Reference was also made to the case of Dr. Wiltshire, who, in 1878, deliberately opened the peritoneal cavity in an acute peritonitis, found a strangulated bowel, relieved it, and saved his patient. Such should be the course of treatment whenever possible. If it is a diseased appendix, cut down and remove it as quickly as you would if it were a diseased Fallopian tube. If this method is not followed the patient is sure to die from the peritonitis. The operation should be made whether pus exists or not. Laparotomy is the only hope in such cases. The tubercular form of peritonitis is no exception to the rule, and it is being demonstrated daily that many patients live on for years after the operation. The time may come, as was surmised by Flint, when laparotomy will be as applicable to the treatment of purulent disease of the abdominal cavity as is thoracentesis, the injection of fluid, and thorough irrigation for pyothorax. The time has come!

DR. N. B. CARSON, of St. Louis, then read a paper on

CHYLOUS CYST OF THE MESENTERY, WITH REPORT OF A CASE.

The case to be reported was the only one found in American literature, and up to the present time the largest cyst of the character on record. He first saw the patient about three years ago, had him under observation for three months, then lost sight of him, and did not again see him until five months ago. The history given was about as follows:

Male, aged thirty-nine, phlegmatic temperament, medium height, slight build, well-nourished, weight about one hundred and fifty pounds. Father and mother living; family history good. At twenty-four years of age he had chills; at thirty-four, typhoid fever; and more recently a malarial attack, when his weight was reduced from his former standard—one hundred and sixty-five—to one hundred and fifty. On examination he found a tumor, the size of a fœtal head, midway between the umbilicus and pubes and in the median line. He diagnosticated it a mesenteric cyst. He made an exploratory puncture, and withdrew several ounces of a milky-white fluid. Upon this discovery he altered the diagnosis to "cyst of the receptaculum chyli." During the three months which succeeded upon the aspiration of the tumor the cyst did not fill up. Five months ago, however, he was sent for, and found that the cyst had rapidly filled, and had of late given him much annoyance. The patient's general health had been good, his weight one hundred and fifty pounds, and the only alteration perceptible in the tumor had been in its size.

On March 3d, the tumor was removed by laparotomy. Five pounds of fluid were first withdrawn; the peritoneal surfaces were then stitched together, the cavity filled

with iodoform gauze, the edges brought together, and the abdominal cavity closed.

Examination of the fluid showed its specific gravity 1014; reaction alkaline. There was present albumin but no fibrin, large granular cells with fatty protoplasm. The chief anatomical elements consisted in minute fat granules resembling those of milk and crystals of chloride of sodium in great numbers. The fluid two months after the operation showed no signs of putrefaction. The walls of the cyst were hard, rough, and free from inflammation.

In conclusion, the author reviewed what is known of the pathology of the disease. He advised the removal of the cyst as soon as it begins to interfere with the movements of the patient or to injure his health. In most cases cure can be effected by incision and removal of the cyst.

DR. MORRIS hoped that he was incorrect in understanding Dr. Price to say that he did not use antiseptics. He was aware that Wegner has shown that disinfectants are not ordinarily necessary within the peritoneal cavity. The lymphatics are ordinarily capable of picking up and carrying away all septic matter. Tait says that he accomplishes by hydragogue catharsis what Heath and others accomplish by drainage.

He thought the only occasion for using drainage in the abdominal cavity is where pus is present.

DR. MANLEY, of New York, took a less extreme view of the treatment by purgation. He thought that the bowels should not be permitted to become locked up, but he preferred action upon them by means of enemata to that by purgation from above. Opium must not, however, be too quickly laid aside, for there is no pain which kills more quickly than pain in the abdomen, neither must we too indiscriminately open the abdominal cavity. Opening the abdomen of a man, whose respiratory action is abdominal, is altogether different from opening the abdomen of a woman, and the result is very apt to be different. In a woman everything favors repair, but in a man it is almost impossible to hold the respiratory muscles quiet.

DR. I. N. QUIMBY, of Jersey City, thought free purgation dangerous and asserted that the best results he had been able to obtain were from the free use of opium, preceded by leeches and poultices to subdue the inflammatory action. After this it is proper to get up free purgation. We must resort to the use of the knife cautiously.

DR. JOHN B. DEAVER, of Philadelphia, stated that he had seen several cases in which operation had been performed with the recovery of the patient. He had also read of a great many cases of peritonitis which had recovered without operation, but he did not believe that half of such cases were peritonitis at all.

DR. PRICE, in closing the discussion, said that many cases which are operated upon died, for the simple reason that the operation is resorted to for the purpose of doing an ideal operation, and upon a patient when in a dying condition. The value of purgation in abdominal surgery is vastly more before the operation than after it. It is difficult to use purgatives after the prolonged use of anæsthetics. We have also in just that class of cases an ether mortality, due to the prolonged anæsthesia. There is another class of cases that die from ether which would die without it. The peritoneum will not tolerate dirt or filth of any kind. Mr. Tait minimizes everything about abdominal surgery; he makes the shortest incision through the shortest course as quickly as possible.

DR. ADDINELL HEWSON, of Philadelphia, in a paper entitled

THE USE TWENTY-FIVE YEARS AGO OF POLARITY FOR LOCATING THE WHEREABOUTS OF A LEADEN BULLET DEEPLY EMBEDDED IN THE BODY,

narrated the case of an army officer treated by him in 1863, in which he had located by means of a small compass worn as a watch charm, the bullet embedded in the tissues at a depth of two inches.

DR. THOMAS H. MANLEY, of New York, reported

A UNIQUE CASE OF FRACTURED EXOSTOSIS OF PUBIS.

The case was that of an Italian, nineteen years of age and a resident of the United States for two years. He complained of occasional severe pain in one leg, and was for some time treated for rheumatism, without benefit. Finally he became so accustomed to the pain that he gave it little thought and continued to work regardless of it. One day while employed, he suddenly became weak; the weakness was followed by a chill, and he was taken home. When admitted, two weeks after, he was very weak, had a temperature of 101° F. and a pulse rate of 120 per minute. No organic disease was discovered. The left leg was very much swollen from Poupart's ligament to the knee. An accumulation of pus was diagnosticated in the region of the pubis, and an incision was made for the purpose of evacuating it. A large exostosis was discovered. An operation was then performed for its removal but although the operation was successful, the patient died a short time afterward. Examination of the exostosis removed showed that it was a reduplication of the pubic bone, and that it had been attached to the latter at one extremity. It was in size about four inches long by half as wide.

DR. ROBERT NEWMAN, of New York, next read a paper on

ELECTROLYSIS IN THE TREATMENT OF STRICTURE OF THE RECTUM.

In introduction he stated that he had prepared with great care a paper on this subject which was entirely too long to read *in toto*. He had fourteen cases to report. In 1871 he had made his first operation for stricture of the rectum by electrolysis on a case complicated by five fistulæ. The operation was a complete success. Several years after, the patient dying of another disease, he secured a post-mortem and found that the stricture had not returned. One important feature of this operation was the use in the rectum of a bullet-pointed electrode. In speaking of the disease under consideration, he stated that females are more liable to have stricture of the rectum than are males. The stricture age is between thirty and forty; the youngest of his cases was twenty-four, the oldest sixty-two. Eight cases were single strictures, four multiple, one had three and one had four strictures. The duration of the disease was from six months to twenty years. The causes were various. Constipation was a great cause; other causes were tuberculosis and syphilis. One case was complicated by five fistulæ; only a few cases had had any previous

treatment; only two had had medical treatment, the others surgical. Six had been operated upon with the knife. In none of the cases had the previous treatment been beneficial; some proved to have been entire failures. It must be admitted by the most sanguine operator that proctatotomy must be followed by the use of the bougie at regular intervals. The best results in the treatment of rectal strictures were obtained from the use of the same method as would be employed in the treatment of urethral strictures, except that a stronger current may be used and the sittings may be more frequent. While in the urethra five milliampères would be sufficient, fifteen milliampères may be used in the rectum. The treatment may last fifteen or twenty minutes, and the sitting should be once in every four days.

Among the conclusions arrived at by the author, the following were stated:

Electrolysis in the treatment of strictures of the rectum is not a panacea; on the contrary, failures may happen, and probably ultimately will happen in the strictures due to carcinoma.

Electrolysis will commonly cure rectal stricture when all other methods have failed.

Electrolysis will cure a certain percentage of cases without relapse better than other modes of treatment, and without the necessity of after-treatment or the use of bougies.

The best chances of cure are in cases of fibrous inflammatory stricture.

The best method of treatment is with the metallic bullet electrode as negative pole, a weak current, and treatment every four days.

DR. MEYER, of New York, spoke of the objections that have been urged against electrolysis by some eminent men. He had, however, seen several cases successfully treated by Dr. Newman. One case in particular he recollected; a case of carcinoma that was kept in a condition of comfort for several months by means of his treatment.

FRIDAY, JUNE 28TH.

DR. CHARLES DENISON, of Denver, Col., described

A NEW RIB CUTTER, AND A CASE OF RESECTION OF RIBS FOR DRAINAGE OF A PULMONARY CAVITY.

He reported a case of croupous pneumouia with all the typical symptoms, crisis occurring on the sixth day, but normal resolution not taking place. During the following summer the patient had chills, fever, and night-sweats. The evidences of a cavity in the lung were soon developed, a cracked-pot sound on percussion, cavernous and broncho-vesicular respiration. The sixth and seventh ribs were resected, four ounces of pus evacuated, a rubber drainage tube inserted, and injections of a ten per cent. mixture of salol in liquid vaseline made twice daily. The improvement was rapid and pronounced, the chest expanding, the fever subsiding, and, finally, the expectoration subsiding. In the operation he used a peculiar pattern of rib-cutter devised by himself. Owing to the collapse of the chest-wall which had occurred, he found the ribs so close together that it was almost impossible to insert any of the known bone-cutters. He, therefore, had the instrument made which he exhibited. It combined a periosteum separator and a rib-cutter in such a manner that the point could with ease be forced between ribs lying in contact or overlapping each other and be made to separate the periosteum from the bone for any desired distance, although the opening through the skin had been but a small one. A mechanical joint was so fitted to the jaws of the instrument that the cutting blade could be closed with such force as easily to sever a rib of beef and sticks of wood of considerable thickness, as demonstrated by the author.

DR. J. O. WHITNEY, of Pawtucket, R. I., asked, Is every case of empyema to be treated by exsection of ribs, or by incision between the ribs? Is it necessary in every case to make so radical an operation? He had operated by simple incision, putting in a silver tube, but he found that owing to collapse of the ribs there was soon considerable pain. He suggested the possibility that an instrument which would saw the rib instead of cutting it, if it could be devised would be preferable to the one presented by the essayist.

DR. MCCOMAS, of Deer Park, reported a case in which he had resorted to repeated aspirations of the chest without benefit. An incision was subsequently made, the chest cavity washed out with a solution of chlorate of potash and boric acid, a drainage tube inserted, compound tincture of iodine injected and retained until severe dyspnœa was produced, then let out and the patient made a good recovery.

DR. J. B. HOPKINS, of Philadelphia, then read a paper on the

ABSORPTION OF A STERILIZED DEAD-BONE DOWEL.

The paper consisted of a microscopic study of the phenomena witnessed during the process of absorption of a dead-bone dowel-pin firmly driven into the femur of a dog. As a result of the study, he arrived at the following conclusions: Where sterilized dead bone is placed in contact with living bone, under favorable circumstances, it undergoes absorption; when placed in contact with periosteum, it undergoes organization. These processess go on most actively between the fifth and eighth weeks, and are not associated with inflammatory action. Where these bone dowel-pins are used for any mechanical purpose in surgery, they may be relied upon for a period of a month or six weeks. After this, their services being no longer necessary, they gradually disappear.

DR. MCCOMAS reported the case of a young lady whose arm had been amputated when she was a child of about four years. He stated that four inches of new bone had grown from the stump, and that the new growth is covered by only a thin layer of skin of a bluish cicatricial character, very sensitive. He expected soon to amputate it.

DR. HOPKINS then closed the discussion by reporting a case in which a small portion of the head of the humerus had been retained in an ampuation and had proved of great advantage, chiefly in preventing the deformity which is usually so marked after shoulder-joint amputations.

DR. J. G. CARPENTER, of Stanford, Ky., read a paper on

THE PATHOLOGY AND TREATMENT OF CHRONIC SCIATICA.

In it the author discussed in a very complete manner the various theories as to the production of neuralgia of this nerve, and the *rationale* of the several methods of

treatment, especially of that by nerve-stretching. The various steps of the latter operation were also described in detail. He considered systematic massage as of the greatest importance in the treatment of most cases of sciatica.

NEW YORK NEUROLOGICAL SOCIETY.

Stated Meeting, June 4, 1889.

THE PRESIDENT, GEORGE W. JACOBY, M.D., IN THE CHAIR.

DR. W. P. WILKIN reported a case of

ALCOHOLIC PARALYSIS WITH CENTRAL LESIONS,

and exhibited microscopic sections of the cord. The patient was a female, aged thirty-one, and died after four days' stay in Bellevue Hospital with acute alcoholism and alcoholic paraplegia. At the autopsy the liver was found to be fatty and much enlarged, weighing eight to ten pounds; kidneys large, cortex thickened and markings indistinct; brain showed much extravasation around the bloodvessels. There was a leptomeningitis about the spinal cord, especially marked over the posterior part, and involving the posterior nerve-roots. Degenerative changes found in the posterior columns, most marked near the periphery. The interstitial increase was not confined to one system of fibres; it extended to a less degree through the lateral columns of the cord. In the sciatic and tibial nerves considerable increase of interstitial tissue, and in some places a disappearance of axis-cylinders. This case was presented as one of ascending degenerative changes, and as showing that alcoholic paralysis may involve lesions not of the periphery only, but also of the central nervous system. He referred to other cases corroborative of this statement.

DR. DANA then exhibited a case of

SEPTIC PERIPHERAL NEURITIS DUE TO PYELO-NEPHRITIS,

with the following history: John L., aged twenty-one, was admitted to hospital Dec. 13, 1888, with symptoms of acute articular rheumatism affecting all extremities. There was no history of alcoholism or venereal disease. There were pus and albumin in the urine, continuing five weeks. In the middle of January paralysis came on, the rheumatism abating. There were anæsthesia and burning pains. The nerves affected were the ulnar and median of both arms, and the anterior tibial of both legs. Atrophy and degenerative reaction appeared. Improvement began about March 16. Electrical reactions taken in April, 1889, showed complete degenerative reaction in flexors of the right arm and partial in those of the left. Patient is now improving very slowly, but there is still sensory and motor paralysis of arms. He regarded the articular affection as a pseudo-rheumatic disorder due to septicæmia. It had not responded to the usual rheumatic remedies.

DR. SACHS said that if there were any question as to the diagnosis of the nervous affection it would lie between peripheral neuritis and atrophy following joint lesions. But the anæsthesia in this case was conclusive in corroborating Dr. Dana's diagnosis.

DR. JACOBY then read a paper entitled

PERIPHERAL PARALYSIS DUE TO CARBONIC OXIDE POISONING,

in which he reported two cases—one of poisoning by coal gas, the other by illuminating gas. The former contains about six per cent., and the latter eight to ten per cent., of carbonic oxide. The action of this agent on the body is twofold—upon the blood and upon the nervous system. The symptoms of its effect upon the nervous system, as variously reported, had been a burning sensation and reddening of the face, dizziness, tinnitus, headache, nausea, vomiting, unconsciousness, tonic and clonic spasms, involuntary passage of urine, feces, and semen, complete paralysis, coma, and death. In some cases excentric pains in the extremities, as well as sensory disorders of the skin, have been noted. Local or general anæsthesia of the skin has been observed in some cases that have recovered, as well as paralysis of voluntary muscles, most of which latter were of central origin. He had found two cases of peripheral origin in literature. His own cases were briefly as follows:

CASE I.—Male, aged thirty-eight, spent an evening conversing with a friend in a tightly closed room, which was heated by a furnace from below. After a time his face became flushed and hot, he felt dizzy, and his head ached; there was nausea, blackness before the eyes, and six hours' unconsciousness supervened. On attempting to walk, then, he noticed that his right leg was weak and his foot turned in, and the right foot was anæsthetic. The author saw him a week later, and found paralysis of the muscles supplied by the peroneal nerve, and anæsthesia. Electrical reactions normal at first, but degenerative later, with concurrent atrophy.

CASE II.—Female, aged eighteen, attempted suicide with illuminating gas. Her room was broken open and she was found dazed but not unconscious. Recovered senses rapidly, but extensors of the right hand were paralyzed. She gradually atrophied, exhibited degenerative reaction, and in time recovered. Slight anæsthesia.

The author was under the impression that both radial and peroneal paralyses occur most frequently in winter, among the poor occupying illy ventilated rooms heated by stoves, and that mild carbonic oxide poisoning may be a more common cause than we imagine.

DR. SACHS thought that an excellent case had been made out for the author's carbonic oxide theory. Numerous cases of musculo-spiral paralysis generally credited to pressure, might possibly have such origin. It is a suggestion that ought to be entertained.

DR. STARR said the cases reported were interesting and no doubt peripheral in their nature. But we should be cautious in ascribing unilateral paralysis to a general intoxicant in the system. Other poisons occasioning paralysis caused symmetrical lesions, as exampled in alcohol, lead, arsenic, diphtheria, where the injuries are always bilateral. He was aware that, of course, as in lead poisoning, the paralysis was sometimes more marked upon one side than another. This was, therefore, a presumption against the cause ascribed by Dr. Jacoby. What was the cause, then? He described cases of his own of coma, where patients lying for many hours would have pressure paralysis of the ulnar or other nerves. In another case a patient had paralysis of the adductors of the arm after a uræmic convulsion, which was ascribed to the grasp of the attendant. He thought pressure of some sort more

probable as a cause in the cases just portrayed than carbonic oxide.

DR. SACHS stated that carbonic oxide differed from other poisons in the rapidity of its effects. Those mentioned by Dr. Starr were very slow. In such rapid cases it might not be safe to apply the symmetrical rule.

DR. DANA regarded the cases as due to the action of both elements. In comas, for instance, very slight pressure may produce paralysis where ordinarily it does not. The paralyses so frequent in alcoholic intoxication are explicable in this way. Carbonic oxide may affect the system in a similar manner.

DR. JACOBY said that the same objections had been made in cases of ether and osmic acid injections. He did not consider his position beyond question, but with the two other cases in literature added to his own, the theory advanced was tenable.

NEWS ITEMS.

The Prevention of the Spread of Consumption.—The following rules to be observed for the prevention of the spread of consumption were approved last Tuesday by the Health Department of New York City, and ten thousand copies were ordered to be printed for public distribution.

Pulmonary tuberculosis (consumption) is directly communicated from one person to another. The germ of the disease exists in the expectoration of persons afflicted with it. The following extract from the report of the pathologists of the Health Department explains the means by which the disease may be transmitted:

"Tuberculosis is commonly produced in the lungs (which are the organs most frequently affected) by breathing air in which living germs are suspended as dust. The material which is coughed up, sometimes in large quantities, by persons suffering from consumption contains these germs often in enormous numbers. . . . This material when expectorated frequently lodges in places where it dries, as on the street, floors, carpets, handkerchiefs, etc. After drying in one way or another it is very apt to become pulverized and float in the air as dust."

By observing the following rules the danger of catching the disease will be reduced to a minimum:

1. Do not permit persons suspected to have consumption to spit on the floor or on cloths unless the latter be immediately burned. The spittle of persons suspected to have consumption should be caught in earthen or glass dishes containing the following solution: Corrosive sublimate, 1 part; water, 1000 parts.

2. Do not sleep in a room occupied by a person suspected of having consumption. The living rooms of a consumptive patient should have as little furniture as practicable. Hangings should be especially avoided. The use of carpets, rugs, etc., ought always to be avoided.

3. Do not fail to wash thoroughly the eating utensils of a person suspected of having consumption, as soon after eating as possible, using boiling water for the purpose.

4. Do not mingle the unwashed clothing of consumptive patients with similar clothing of other persons.

5. Do not fail to catch the bowel discharges of consumptive patients with diarrhœa in a vessel containing corrosive sublimate 1 part, water 1000 parts.

6. Do not fail to consult the family physician regarding the social relations of persons suffering from suspected consumption.

7. Do not permit mothers suspected of having consumption to nurse their offspring.

8. Household pets (animals or birds) are quite susceptible to tuberculosis; therefore do not expose them to persons afflicted with consumption; also, do not keep, but destroy at once, all household pets suspected of having consumption, otherwise they may give it to human beings.

9. Do not fail to cleanse thoroughly the floors, walls, and ceilings of the living and sleeping-rooms of persons suffering from consumption at least once in two weeks.

Death of Dr. Charles Bland Radcliffe.—We regret to learn of the death, on June 18th, of Dr. C. B. Radcliffe, from the rupture of a varicose vein. Dr. Radcliffe had long held an eminent position as an authority on nervous disease and as a highly esteemed writer on questions of nerve force, especially in its electrical relations.

The Pentacle of Rejuvenescence.—On two occasions this month Dr. Brown-Séquard has made communications of a most extraordinary nature to the Société de Biologie of Paris. The statements he made—which have, unfortunately, attracted a good deal of attention in the public press—recall the wild imaginings of mediæval philosophers in search of an *elixir vitæ*. He obtained by compression and washing from the testicles of young animals a fluid, which he injected into the subcutaneous cellular tissue with a hypodermic syringe. He performed the experiment on himself, repeating the injection almost every day for a fortnight, with results which appeared to him to warrant an immediate communication to the Society. He stated that he had experienced a rejuvenescence of all his forces, physical and psychic; all that had become difficult or impossible for him owing to advancing age became once more easy, and he found himself possessed of the same vigor as he had had thirty years before. He could undergo fatigue in standing, travelling, and in intellectual labor previously impossible; the functions of defecation and micturition also were discharged with greater ease. MM. Féré and Dumontpallier, in commenting on M. Brown-Séquard's statements, observed that they would require to be rigidly tested and fully confirmed by other self-experimenters before they were likely to meet with general acceptance; and in this opinion we fully concur.—*British Med. Journal*, June 22, 1889.

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